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A COMPREHENSIVE RAPID-ASSESSMENT-OF-FLUTTER / EJECTION-LOADS (RAFEL) SOFTWARE SYSTEM FOR AIRCRAFT / STORE COMPATIBILITY

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13. ABSTRACT (*Maximum 200 words*)
This report documents a design scheme for a rapid assessment of flutter and limit cycle oscillation of aircraft with multiple store configurations. Using the F-16A as a baseline aircraft, three different aeroelastic instability responses, including classical flutter, typical LCO, and non-typical LCO, have been successfully identified. These three distinct responses are representative of the broad spectrum of aeroelastic responses encountered by fighter aircraft with external stores. To rapidly compute the flutter prediction of the aircraft with multiple store configurations, a procedure is proposed to efficiently reuse the aerodynamic influence coefficient (AIC) matrices of aircraft with multiple stores. The procedure used the ZAERO code, that contains a unified aerodynamic module for all Mach numbers, as the basic software system. To discern the difference between the flutter and LCO responses, and to correlate the numerical predictions with the flight altitude, the matched point option of the g-method of ZAERO was used. The influence of the aerodynamic stores on the aeroelastic instability is investigated using a number of aerodynamic models, including the isolated wing-tip launcher model, and the whole aircraft with and without stores. Using a more refined aerodynamic model, the results show good agreement between the present numerical predictions and flight flutter test data, including the oscillation frequency and the onset speed of the three flutter and LCO cases.

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Aircraft/Store Aerodynamic Interference, Unified Aerodynamic Influence Coefficient, Rapid Flutter Solution, Classical Flutter/Typical LCO/Non-typical LCO, Massive Aircraft/Store Configurations, Database Management System, Dynamic Memory Database System

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FOREWORD

This Phase I SBIR final technical report entitled "*A Comprehensive Rapid-Assessment-of-Flutter / Ejection-Loads (RAFEL) Software System for Aircraft / Store Compatibility*," has been prepared by ZONA Technology, Inc. (ZONA), under contract number FO 863501-C-0049, sponsored by The Department of The Air Force/Air Armament Center, Eglin Air Force Base, FL 32542. This report presents the findings as of January 16, 2002, from a research and development program begun April 16, 2001.

Mr. Ping-Chih Chen of ZONA was the Principal Investigator, Mr. E. Sulaeman and Dr. D.D. Liu of ZONA were co-principal investigators. Mr. Major Baron Canty and Dr. Charles M. Denegri Jr. of Eglin Air Force Base were the Government Technical Monitor. The author would like to thank Dr. Denegri for providing structural and aerodynamic data and for his valuable comments and suggestions throughout the course of this development.

This report documents the entire work under the Phase I effort. It is published for the dissemination of technical information. The findings and conclusions are those of the authors and do not necessarily represent the views of the United States Government. Distribution of this report shall be in accordance with the Distribution Statement of the Report Documentation page found on the cover hereof.

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ACRONYMS

AIC	Aerodynamic Influence Coefficient
ASE	Aeroservoelasticity
CFD	Computational Fluid Dynamics
CFL3D	High-level computational fluid dynamics code by NASA (Ref 19)
CPU	Computional Processing Unit
DLM	NASTRAN's code to generate steady/unsteady subsonic aerodynamics based on a doublet lattice method.
DMAP	Direct Matrix Abstraction Program
DMS	Data Mining System
FEM	Finite Element Model
GUI	Graphical User Interface
LCO	Limit Cycle Oscillation
MATLAB	Matrix Laboratory (An interactive system and programming language for general scientific and technical computation.)
MSM	Massive Store Management
NASTRAN	Structural FEM software product of MSC

PVM	Parallel Virtual Machine
RAFEL	Rapid Assessment of Flutter / Ejection Load
SDG	Store Database Generator
UAIC	Unified Aerodynamic Influence Coefficient
ZAERO	ZONA's aeroelasticity and unstable aerodynamic software system covering all Mach ranges including ZONA6, ZONA7, ZTAIC and ZONA7U for complex aircraft configuration with external stores (Ref 6-10)
ZDM	ZONA Dynamic Module
ZONA	ZONA Technology, Inc.
ZONA51	ZONA's code implemented in NASTRAN to generate steady/unsteady supersonic aerodynamics for complex aircraft configuration with external stores (Ref 4). Capable to handle only flat type configuration.
ZONA6	ZONA's code to generate steady/unsteady subsonic aerodynamics for complex aircraft configuration with external stores (Ref 6)
ZONA7	ZONA's code to generate steady/unsteady supersonic aerodynamics for complex aircraft configuration with external stores (Ref 7)
ZONA7U	ZONA's code to generate steady/unsteady unified hypersonic and supersonic aerodynamics for wing-body/aircraft configurations with external stores(Ref 8)
ZTAIC	ZONA's Transonic Aerodynamic Influence Coefficient code; Generates unsteady transonic aerodynamics for complex aircraft configuration (Ref 7)

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SECTION 1

INTRODUCTION

This final technical report describes the work performed by ZONA Technology, Inc. (ZONA) under an SBIR Phase I contract FO8635-01-C-0049, entitled "*A Comprehensive Rapid-Assessment-of-Flutter/ Ejection-Loads (RAFEL) Software System for Aircraft /Store Compatibility*".

The overall Phase I technical objective is to develop an accurate and computationally efficient software system for the aeroelastic solutions of massive number of aircraft/store configurations.

The F16 is selected as a baseline aircraft with the following specific objectives:

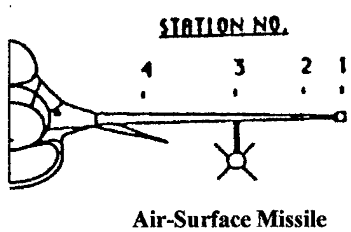
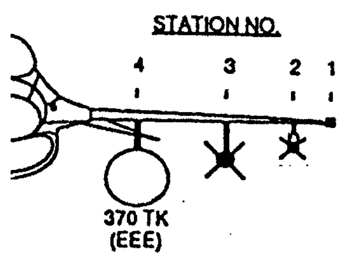
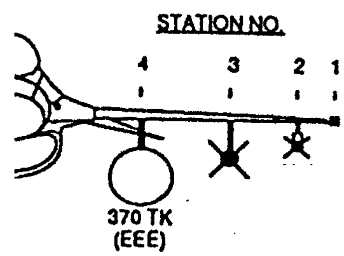
1. Investigate the accuracy of ZONA's Aeroelastic Software System (ZAERO) to predict aeroelastic instability of the F-16 aircraft with multiple stores for subsonic, transonic and supersonic Mach number.
2. Investigate the capability of ZAERO to differentiate various types of aircraft/store aeroelastic instability behavior including classical flutter, typical limit cycle oscillation (LCO) and non-typical LCO.
3. Validate the accuracy of ZAERO aeroelastic system with the flight test data of three proposed F-16/store configurations (Table 1.1).
4. Using ZAERO as the basic software system, design a *Massive Store Management (MSM)* system that can substantially increase the computational efficiency of ZAERO.

In this Phase I effort, we have accomplished the following:

- Performed aeroelastic instability computation using ZAERO for a number of F-16 aircraft in subsonic, transonic and supersonic flight regimes and at various altitudes.
- Investigated the influence of various store aerodynamic models including underwing/tip launchers, weapons and fuel tank aerodynamic model to the aeroelastic behavior of the whole aircraft/store configurations.
- Investigated the influence of aircraft rigid body modes to the aeroelastic instability of various aircraft/stores configurations.
- Investigated the capability of linear and nonlinear unsteady aerodynamic procedures of ZAERO to differentiate various aeroelastic instability behavior including classical flutter, typical limit cycle oscillation (LCO) and non-typical LCO of F-16 aircraft with multiple stores.
- Investigated the correlation between the flight test data of the three proposed F-16/store configurations and the aeroelastic response computed using ZAERO.
- Designed the Massive Store Management (MSM) system as a platform to the rapid aeroelastic prediction (RAFEL) scheme based on the ZAERO aeroelastic system for the assessment of flutter/LCO of massive aircraft/store configurations.

To validate the accuracy of the present procedure, three configurations of F-16A Block 15 given in Reference 1 are selected and shown in the following Table.

Table 1.1 F-16A Store Configurations.

Sta. No.	Aeroelastic Response Type		
	Case 1 **Classical Flutter**	**Case 2** **Typical LCO**	**Case 3** **Non-typical LCO**
1	LAU-129/A launcher	LAU-129/A launcher	16S210 launcher
2	Empty Station	LAU-129/A launcher AIM-9L missile	LAU-129/A launcher AIM-9L missile
3	Launcher/pylon Air-surface missile	Launcher/pylon Air-surface missile	Launcher/pylon AIM-120A missile
4	Empty Station	Pylon 370-gal fuel tank (empty)	Pylon 370-gal fuel tank (empty)
Front View			

1.1 Background

Flutter clearance of a modern fighter aircraft with massive store/weapon configuration is a major engineering task in aircraft/store weapon compatibility. This task requires expedient and yet accurate solutions in a short-time framed demanded by rapid military responses when facing today's ever-changing international situation. Since there can be more than 400,000 store/weapon combinations for a typical fighter aircraft, the flutter clearance for such configuration requires not only the solution accuracy but also computational efficiency to rapidly identify the critical cases. The procedure is needed also to identify a wide variety of aeroelastic response characteristics including flutter, divergence and limit cycle oscillation.

1.2 Limit Cycle Oscillation (LCO) of Wing with External Stores

Limit Cycle Oscillation (LCO) has been a persistent problem on several current fighter aircrafts and is generally encountered with external store configurations. Denegri (Ref 2) provided a detailed description of the aircraft/store LCO phenomenon. Norton (Ref 3) gave an excellent overview of LCO of fighter aircraft carrying external stores and its sensitivity to store carriage configuration and mass properties.

LCO can be characterized as sustained periodic oscillations which neither increase nor decrease in amplitude over time for a given flight condition. Using a refined aerodynamic model of the aircraft and stores, ZONA (Chen, Sarhaddi and Liu – Ref 4) has shown that wing/store LCO is a post-flutter phenomenon whenever the flutter mode contains low unstable damping. This type of flutter mode is called "*hump mode*". Since the aircraft structure usually contains structural nonlinearity such as friction damping, this amplitude-dependent friction damping can stop the growth of amplitude (due to flutter), thus the structural system would result in steady-state oscillation. This is known as LCO. By contrast, a typical flutter mode is a result of growth of amplitude largely due to destabilizing negative aerodynamic damping, hence a drastic increase in damping beyond the neutral stability point, or the flutter point (g = 0). A typical flutter mode and hump mode are shown in Figure 1.1.

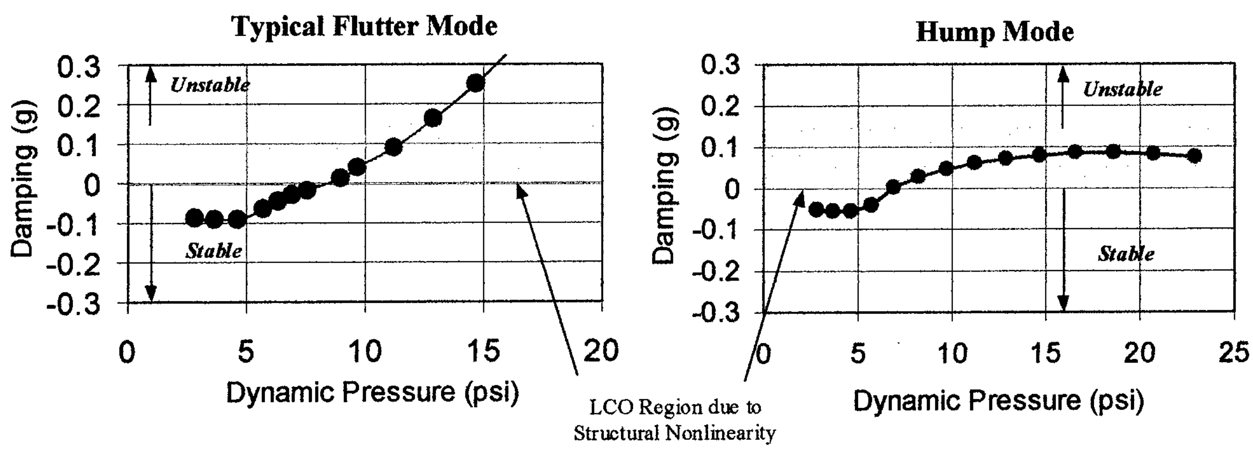


Figure 1.1 Typical Flutter Mode and Hump Mode by Flutter Analysis

Admitting nonlinear friction damping, Denegri (Ref 5) also showed consistent trends that hump mode can be used to correlate the flutter solutions with LCO flight test data of F-16's. Since the structural characteristic varies for different aircraft/store configurations, it is unlikely that the fixed-gain type of control system would work for wing/store LCO suppression in general. It appears that an adaptive controller with an online system identification process would be most appropriate for LCO suppression of a wide range of aircraft/store configurations.

1.3 Technical Issues and Challenges

Rapid assessment of flutter/LCO of aircraft with multiple stores presents challenging problems to be resolved. Several pertinent technical issues are addressed as follows.

- *Solution Accuracy Including Algorithm Robustness, Modeling Fidelity, and Extended Flight Regimes*

  Current engineering analysis enjoys sufficient accuracy provided by the structural finite element (FEM) methodology. But a compatible level of accuracy provided by unsteady

aerodynamics for flutter/ejection loads is lacking. This calls for an unsteady aerodynamic method that can deal with complex configurations such as a whole aircraft with external stores in all flight regimes including subsonic, transonic and supersonic Mach numbers, and with sufficient solution accuracy.

- *Computational Efficiency for Massive Store/Aircraft Combinations*

  CFD has become an accurate tool for aerodynamic analysis/design. Recognized by experienced aeroelasticians, however, unsteady CFD is far from being an efficient tool for aircraft aeroelastic analysis, let alone for the massive store/aircraft aeroelastic requirement. Using the CFL3D code (Ref 2), ZONA's recent study shows that it requires 4 days of computing time to complete a transonic LCO study on a 1 GHz computer of a two-dimensional (2-D) airfoil (Ref 3). The requirement to process 2000 flutter configurations in two weeks is a stringent one. Since unsteady CFD is out of the question, one resorts to the well-practiced unsteady-aerodynamics computational procedure called AIC (Aerodynamic Influence Coefficient) matrix. The merit of AIC matrix is that it will provide the corresponding unsteady aerodynamics (in frequency domain) to a fixed aerodynamic configuration, but can couple with alternative structural arrangements. The AIC, and hence the unsteady aerodynamics, is computed once and for all and can be re-used for repetitive aeroelastic computations. For slightly different aerodynamic configurations such as the same aircraft with different stores, only a small subset (sub-matrix) of the AIC matrix needs to be regenerated.

- *Rapid Selection for Critical Flutter, LCO and Ejection Loads*

  This calls for an automated *data mining system* that can search for and identify the critical flutter, LCO and ejection loads through the data set generated by massive flutter/ejection load analyses. In addition, this data mining system must be able to recognize an LCO case from the flutter-solution cases, to identify the severity of the flutter instability, to compute the sensitivity of the flutter/LCO to the change of flight speed, and to provide recommendations regarding the need of additional flight test to confirm the software predictions.

1.4. Overall Design Strategy

It appears that the newly released ZAERO aeroelastic software system is a viable methodology to answer all the above technical challenges. ZAERO is a comprehensive aeroelastic software system which contains over a dozen modules for arbitrary aircraft configurations with complex store/weapon combination. Application of ZAERO for the rapid assessment of the aircraft/store aeroelastic instability can be constructed based on the following two parts:

- *The off-line analysis.* In this stage, the most time consuming computation of the unsteady aerodynamic and structural finite element data base of the aircraft/store are generated. Only the portion invariant to the changes in the store configuration is generated. For a typical flutter calculation of the aircraft/store, the invariant portion of the aerodynamic data base can be as large as 95% ~ 99% of the total aerodynamic data required. This off-line analysis stage

can be performed independent of any store configuration. The generation of the database in the off line analysis clearly will reduce the computational time significantly.

- *The on-line analysis.* In this stage only small portion of the calculation is needed to generate the aerodynamic data associated with the variation of the store configurations.

1.5 Required Software Tools

Two engineering disciplines in terms of software tools are employed for the present study, namely MSC/NASTRAN and ZAERO. MSC/NASTRAN is used to perform the structural finite element (FEM) analysis and to generate the generalized mass and stiffness matrices as well as mode shapes of the aircraft structure. ZAERO is ZONA's commercialized aeroelastic software system that integrates the essential disciplines required by aeroelastic and aeroservoelastic design/analysis.

SECTION 2

COMPREHENSIVE RAPID-ASSESSMENT-OF-FLUTTER/EJECTION-LOADS (RAFEL) SOFTWARE SYSTEM

The RAFEL software system consists of three sub-systems: an invariant unified aerodynamic influence coefficient (UAIC) submatrix generation system, a Massive Store Management (MSM) system, and a data mining system. The core of the RAFEL system is the ZAERO aeroelastic system which is used as a tool to generate the AIC matrix and solve the aeroelastic system of equations. A detailed description of ZAERO is presented first in the next section, followed by the application of ZAERO in the RAFEL system.

2.1 ZAERO – An Engineer's Toolkit for Aeroelastic Solutions

ZAERO is ZONA's aeroelastic software system that integrates the essential disciplines required by aeroelastic and aeroservoelastic design/analysis (Ref 17). Figure 2.1 illustrates six essential modules in ZAERO that consist of five engineering modules namely the Unified AIC (UAIC), 3-D spline, flutter, aeroservoelasticity (ASE) and transient loads modules and a memory and database management system called the ZDM module.

The functionality of the ZDM (ZONA Dynamic Memory and Database Management System) module is equivalent to the DMAP/GINO system of MSC/NASTRAN. The entire ZAERO program architecture is developed based on the ZDM module that controls the input/output data entities of all engineering modules. The ZDM module will also serve as a basic database system for the development of the proposed massive-store management system. Throughout the years, all of the ZAERO modules have been continuously validated by many test cases ranging from the verification with exact solutions for simple geometries to the comparison with experimental or CFD data for complex configurations. The main features of these five modules now follow.

The UAIC Module

The UAIC module shown in Figure 2.1 consists of four unsteady aerodynamic methods, namely ZONA6, ZTAIC, ZONA7 and ZONA7U, which jointly provide a Unified Aerodynamic Influence Coefficient (UAIC) matrix covering all Mach numbers for complex aircraft/store configurations. By contrast, MSC/NASTRAN contains only the DLM method for subsonic flows and the ZONA51 method for supersonic flow and can only handle flat-plate type configurations. Note that ZONA51 method (Ref 4) in MSC/NASTRAN is a ZONA software product for supersonic lifting surface unsteady aerodynamics that has been integrated into the aeroelastic option of MSC/NASTRAN since 1990. Today, ZONA51 has become the industrial standard method for supersonic lifting surface unsteady aerodynamics with over 120 users worldwide. The features of these four unsteady aerodynamic methods in the UAIC module are:

- ZONA6 (Ref 5): generates steady/unsteady subsonic aerodynamics for wing-body/aircraft configurations with external stores/nacelles including body wake effects.
- ZTAIC (Ref 6): generates unsteady transonic (modal) AIC's using externally-provided steady mean pressures.

- ZONA7 (Ref 7): generates steady/unsteady supersonic aerodynamics for wing-body/aircraft configurations with external stores/nacelles (formerly ZONA51 for lifting surfaces).
- ZONA7U (Ref 8): generates steady/unsteady unified hypersonic and supersonic aerodynamics for wing-body/aircraft configurations with external stores/nacelles.

Among these four methods, the transonic code ZTAIC is capable of predicting the "*transonic dip*" associated with flutter boundary of fighters. While using steady pressure input (provided by measurements or a CFD Navier-Stokes Solver), the ZTAIC method solves the transonic small disturbance equation for unsteady aerodynamics. Unlike typical CFD methods, ZTAIC does not require grid generation. Because of the accurate steady pressure input, the correct unsteady shock location and strength computed by ZTAIC are ensured. This can be seen by the excellent correlation between ZTAIC prediction and wind tunnel test data of the AGARD 445.6 transonic flutter boundary (Figure 2.2) and the unsteady pressure distribution of the oscillating Lessing wing (Figure 2.3).

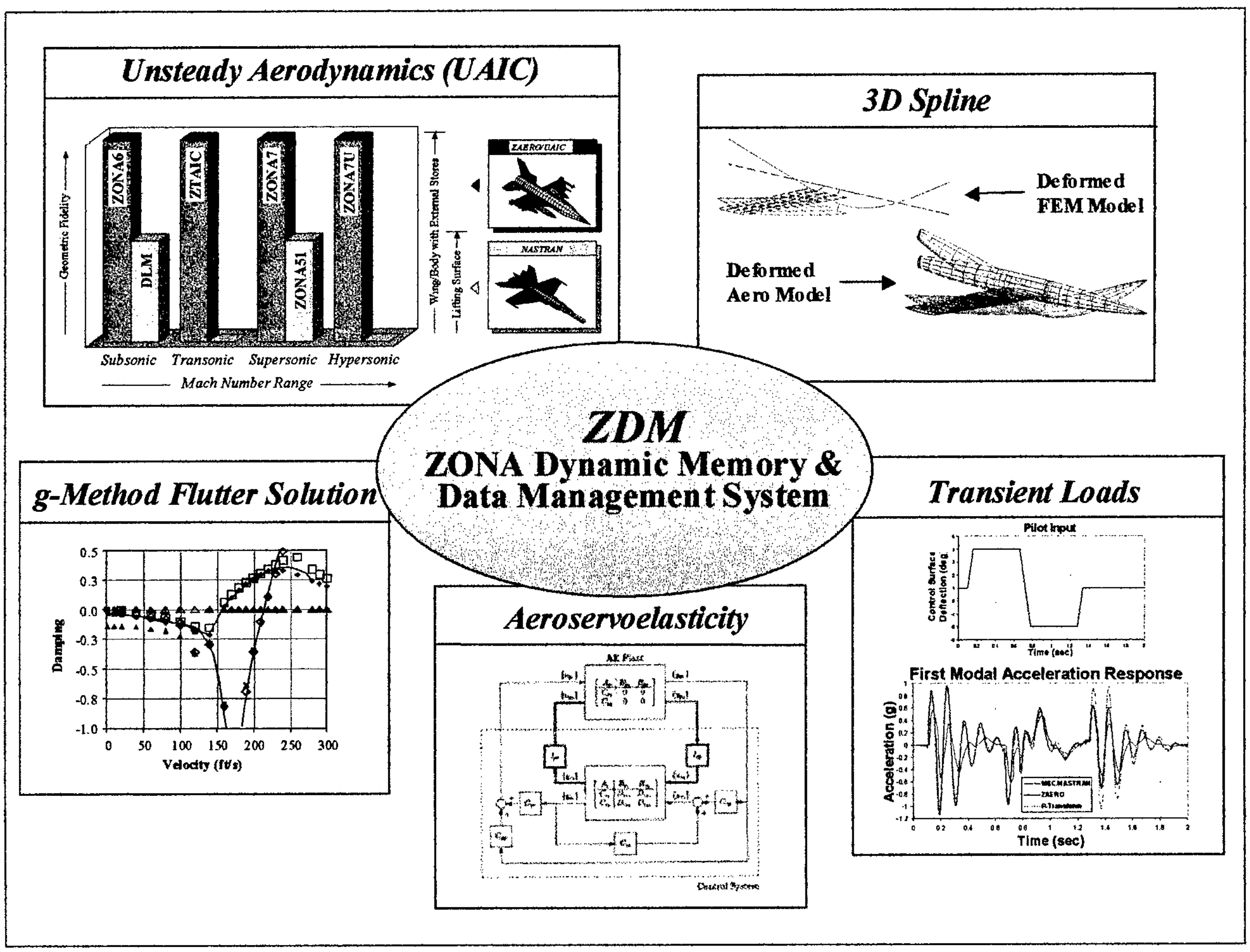
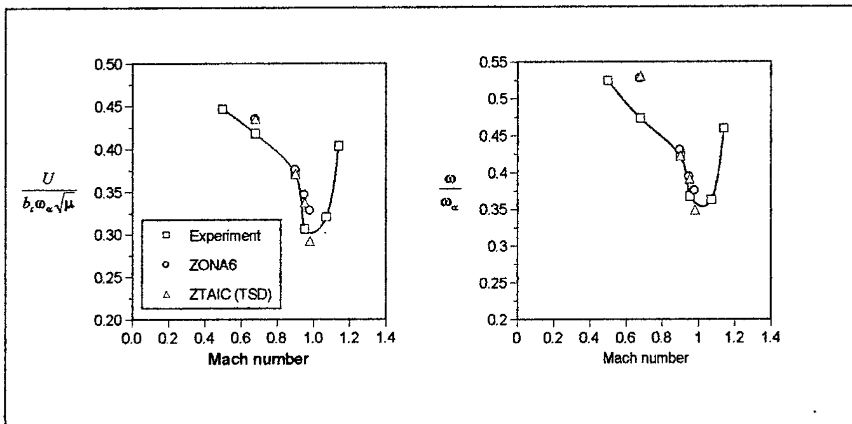


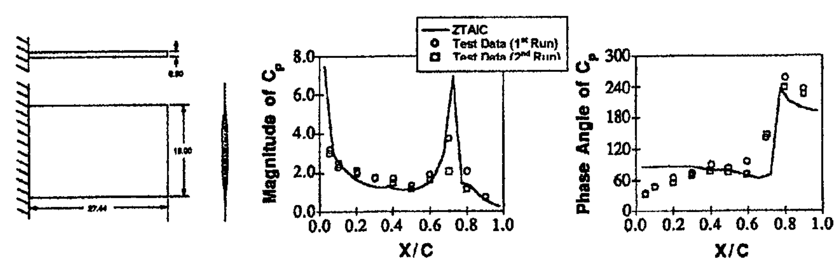
Figure 2.1 Six Essential Modules in ZAERO.

As discussed earlier, due to the pure-aerodynamic characteristics of the AIC matrix, the UAIC matrices generated by the UAIC module can repeatedly be used when changes in different structural properties or slightly different aerodynamic configurations are needed in aeroelastic analysis/design. This renders ZAERO a computationally efficient tool for massive flutter analysis.



- Steady pressure input provided by CAPTSD
- Good agreement with test data
- At subsonic speed, ZTAIC results approach that of ZONA6, as expected
- ZTAIC predicts the transonic flutter dip

Figure 2.2 AGARD Standard 445.6 Wing.



- Used Lessing's test data as the steady pressure input
- Thus yields correct unsteady shock position and magnitude

TRANSONIC UNSTEADY PRESSURES

Figure 2.3 Lessing Wing in First-Bending Oscillation (M=0.9, k=0.13, η=0.5 x span).

The 3-D Spline Module

For low fidelity unsteady aerodynamic methods like DLM, the Infinite Plate Spline (IPS, Ref 9) is sufficient for the transferal of data between the structural and aerodynamic models. To perform the data transferal for high fidelity modeling of an entire aircraft/store configuration requires a 3-D spline capability. The 3-D spline module of ZAERO is equipped with an improved 3-D Thin Plate Spline (TPS, Ref 10) method that provides the displacements and loads in six degrees of freedom at each structural and aerodynamic grid point. The 3-D spline module can also be used to generate a deformed aerodynamic model to verify the spline input by graphical visualization. A typical graphical display of a deformed wing-body configuration is shown in the 3-D spline module diagram of Figure 2.1.

The Flutter Module/g-Method

The flutter module consists of two flutter solution techniques; *the K-method* and *the g-method.* The g-method is a ZONA's newly developed flutter solution method (Ref 11) that generalizes the K-method and the P-K method for true damping prediction. The g-method is superior to the P-K method by the following merits.

- *True Damping Prediction*
  The theoretical foundation of the true-damping prediction capability of the g-method is based on the inclusion of a first-order aerodynamic damping term in the flutter equation that is rigorously derived from the Laplace domain aerodynamics. Such a true-damping prediction capability is lacking in the K-method and P-K method.
- *Solution Robustness: the g-Method*
  The g-method utilizes a reduced frequency sweep technique to search for the roots of the flutter equation and a predictor-corrector scheme to ensure the robustness of the sweep technique. The P-K method typically requires an iterative procedure for flutter solutions and occasionally suffers from a solution breakdown. By contrast, the g-method's sweep technique is proven to be efficient and robust and can obtain an unlimited number of aerodynamic lag roots. The inclusion of aerodynamic lag roots can provide important physical insight of the flutter solutions.
- *Match-Point Flutter Solutions*
  The generalized formulation of the g-method (as opposed to the K-method and the P-K method) provides an automated matching feature of the flutter solution that satisfies the Mach number-velocity-density relations of a given atmospheric table.

Therefore, with the g-method built in, the flutter module in ZAERO can further be developed as an effective *data mining system* to search for critical flutter, LCO and ejection load cases. This is attributable to:

- Its true damping prediction can accurately identify the severity and sensitivity of the flutter instability. With a nonlinear structural damping criteria which will be shown in the later section, the g-method solution can be used to recognize an LCO case from the flutter-solution cases.
- Its match-point flutter solution feature avoids an additional iterative procedure between the densities and velocities which is normally required by a non-match-point flutter solution procedure. Therefore, the match-point flutter solution can be directly correlated with flight test data.
- Its reduced frequency sweep technique can ensure the robustness of an automated data mining system which would not work with an unreliable P-K method.

In addition, the ZAERO/flutter module has an existing capability for rapid flutter solutions of aircraft with different inertial properties (for instance, the fuel weight variations). This capability utilizes a so-called "*mass increment technique*" which perturbs the following flutter equation with incremental mass ΔM, i.e.

$$\phi^T (M + \Delta M)\phi \ddot{q} \; + \; \phi^T k \phi q \; = \; q_\infty Q(ik) q \qquad (2.1)$$

where:

$\phi^T M \phi$ and $\phi^T k \phi$ are the generalized mass and stiffness matrices, respectively, of the baseline aircraft.

$q_\infty Q(ik)$ is the generalized aerodynamic force, q is the generalized modal coordinate, ϕ is the mode shapes of the baseline aircraft, and

ΔM is the incremental mass added to (or subtracted from) the baseline aircraft, e.g., increase (or decrease) of fuel in the tank.

The validity of Eq (2.1) lies in the fact that the flutter mode of the aircraft with the incremental mass can be expressed by the mode shapes of the baseline aircraft (without incremental mass) if a sufficient number of modes are used. This also implies that solving Eq (2.1) does not require additional FEM and unsteady aerodynamic analysis because all matrices in Eq (2.1) remain unchanged except ΔM, an input parameter.

Some ZAERO users have adopted the mass increment technique to accelerate the massive store screening process by also ignoring underwing store aerodynamics. In this way, a very fast procedure results for flutter solution generation of thousands of store configurations by using only one set of AIC and FEM solutions. This procedure can be used as a preliminary step to compliment the MSM procedure for rapid screening of critical flutter cases. ZONA has implemented this procedure as an option in the RAFEL system.

2.2 Application of ZAERO to RAFEL Software System

The RAFEL software system consists of three sub-systems: an invariant unified aerodynamic influence coefficient (UAIC) submatrix generation system, a Massive Store Management (MSM) system and a data mining system.

2.2.1 Invariant UAIC Submatrices for Store/Aircraft Configurations

The unified Mach number Aerodynamic Influence Coefficient (UAIC) matrix generated by the ZAERO/UAIC module is a pure aerodynamic entity and is independent of the structural properties. For a given aircraft with multiple stores, this UAIC (at a given Mach number and reduced frequency pair) can be partitioned into five different kinds of submatrices, i.e.

$$[UAIC] = \left[\begin{array}{c|c|c|c} A_{aa} & A_{s_1 a} & & A_{s_i a} \\ \hline A_{as_1} & A_{s_1 s_1} & & A_{s_i s_1} \\ \hline & & \ddots & \\ \hline A_{as_i} & A_{s_1 s_i} & & A_{s_i s_i} \end{array}\right] \tag{2.2}$$

A_{aa} is the aircraft-to-aircraft aerodynamic submatrix

$A_{s_i s_i}$ is the ith store-to- ith store aerodynamic submatrix

$A_{s_i a}$ is the ith store-to-aircraft aerodynamic submatrix

A_{as_i} is the aircraft-to- ith store aerodynamic submatrix, and

$A_{s_is_j}$ and $A_{s_js_i}$, where i ≠ j, represents the store-to-store aerodynamic submatrix between each two different stores.

The only submatrices in Eq (2.2) that need to be newly computed are the store-to-store submatrices (shaded areas in Eq 2.2) $A_{s_is_j}$ and $A_{s_js_i}$, where i ≠ j. Clearly, the self-influence submatrices A_{aa} and $A_{s_is_i}$ shown above are invariant as long as their own aerodynamic shapes remain the same. For a given type of store designated to a fixed weapon-carriage station, it can be seen that A_{s_ia} and A_{as_i} are also invariant since the store-carriage stations with respect to a designated aircraft remain fixed. This implies that the submatrices A_{aa}, $A_{s_is_i}$, A_{s_ia}, and A_{as_i} can be pre-computed and saved in a database. For a given new store arrangement, these submatrices need not be re-computed, rather they can be retrieved from the database. In so doing, the computing effort of the total UAIC matrix generation can be substantially reduced. In fact, the proposed Massive Store Management (MSM) software system is constructed according to this proposed procedure which will be discussed in the next section.

2.2.2 The Total RAFEL Software Architecture

Figure 2.4 depicts the total software system architecture for massive flutter, LCO, ejection load analysis and the critical case selection. This software system consists of three subsystems: an invariant UAIC submatrix generation system, a Massive Store Management (MSM) software system, and a data mining system.

Invariant UAIC Submatrix Generation System

The functionality of this system is to generate the A_{aa}, $A_{s_is_i}$, A_{s_ia}, and A_{as_i} invariant UAIC submatrices, where i = 1, …, n, and n represents the number of all available stores with their associated weapon-carriage stations. The generation of these invariant submatrices is based on the assumption that the designated aircraft has fixed weapon-carriage stations. For instance, the F-16 aircraft shown in Part 1 of Figure 2.4 has 9 weapon-carriage stations. Every station has a set of candidate stores to be carried.

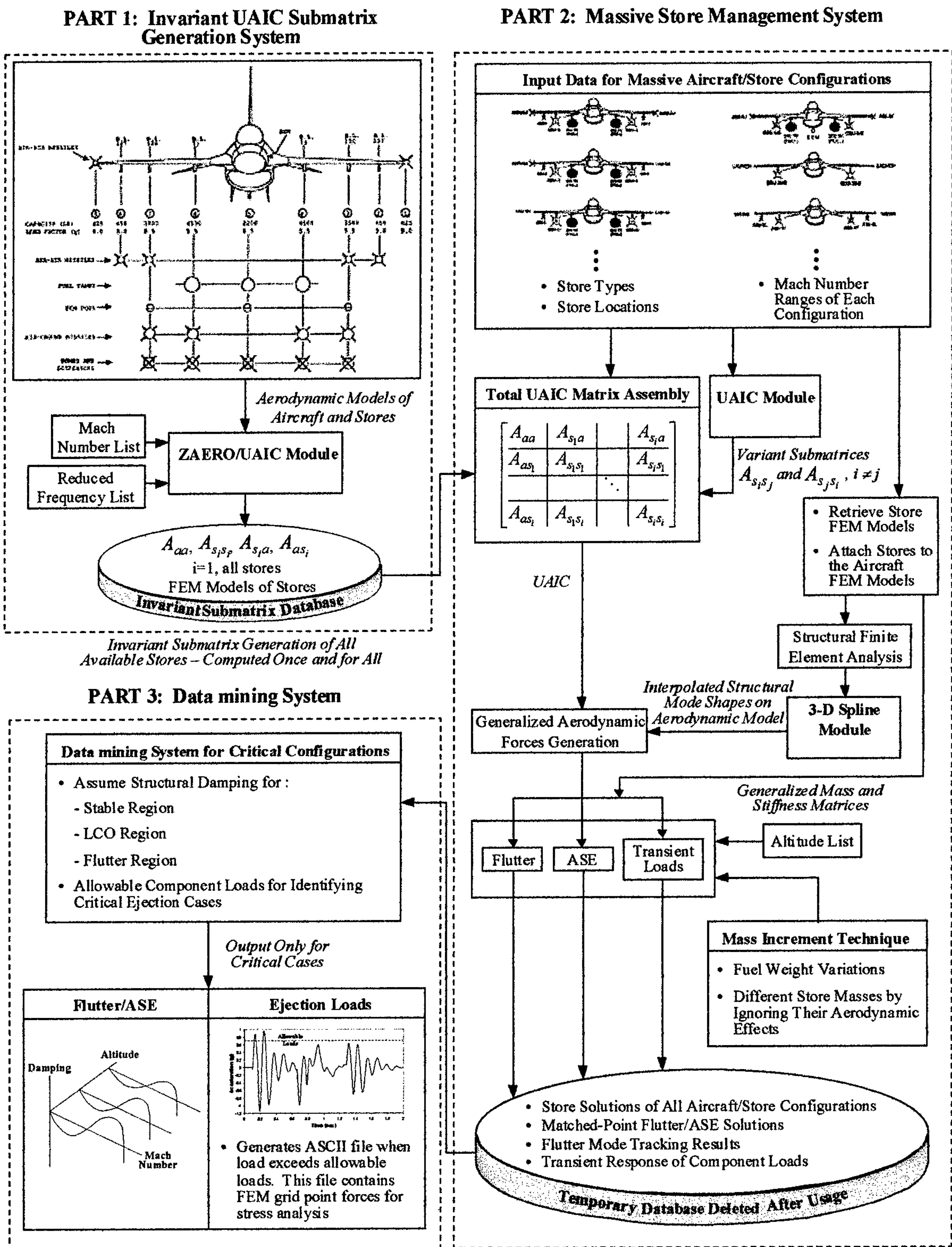


Figure 2.4 The Total RAFEL Software Architecture.

To design the invariant UAIC submatrix generation system, we first provide each store a label called the "*store label*" which marks the store and its designated weapon-carriage station. Note that a different store label is assigned for the same store located at different stations. Next, the

ZAERO/UAIC module is employed to generate the UAIC submatrices $A_{s_is_i}$, A_{s_ia} and A_{as_i} of all stores and save these submatrices in a database. Because the aircraft-to-aircraft submatrix A_{aa} is independent of stores, it only needs to be computed once. Note that each of the invariant matrix is also a function of Mach number and reduced frequency. These Mach numbers and reduced frequencies can be pre-selected according to the flight envelope of the designated aircraft and its structural characteristics. Clearly, to generate the above database that contains the invariant submatrices of all stores requires a large computing time. However, since these submatrices are computed once and for all, this long computing time should be considered as off-line data preparation and hence should not influence the efficiency of the subsequent massive store/aircraft aeroelastic analysis. Of course, if a new store is added to the list, its associated submatrices need to be newly computed in this manner and added to the database.

Massive Store Management System

The Massive Store Management (MSM) system is essentially a database management system for the total UAIC matrix assembly. For a given aircraft with multiple store configuration, the MSM system first retrieves the invariant submatrices from the database. Next, it activates the ZAERO/UAIC module to compute all variant submatrices. Finally, it assembles the invariant and variant submatrices together and generates the total UAIC matrix. Once the total UAIC matrix is obtained, the remaining tasks for an aeroelastic analysis are performed by the existing ZAERO engineering modules, as shown in Part 2 of Figure 2.4.

The 3-D spline module reads the output of the structural finite element analysis of the given aircraft/store configuration and computes the interpolated mode shapes on the aerodynamic model. Once these mode shapes and the total UAIC matrix are available, the generalized aerodynamic force matrices can be obtained immediately for an aeroelastic analysis, i.e. flutter, ASE or transient load analysis. This analysis is performed at various altitudes, and the solution at every Mach number and altitude pair is a matched-point solution.

It should be noted that the MSM system is a fully automated process. For a given aircraft/store configuration, the input of the MSM system (*e.g.*, the one shown in Part 2 of Figure 2.4) is the store label of each store and the Mach number range of interest. Since this constitutes a small amount of input, it takes little effort to set up an input file for a massive number of aircraft/store configurations. The MSM system continuously processes each configuration and stores its aeroelastic solutions on a temporary database. Thus, once the MSM system is activated, manual interaction from the engineer is no longer required.

Data Mining System

The main objective of the data mining system is to rapidly screen through the temporary database generated by the MSM system and to select the critical flutter, ASE, or ejection load cases for output display. The inputs of the critical flutter/ASE cases are the assumed structural damping levels that define three stability regions, namely the stable region, the LCO region, and the flutter region. The data mining system screens through all the damping solutions at every Mach number and altitude (M-h) pair for a particular aircraft/store configuration. If the damping

solutions at all M-h pairs are below the stable region, this configuration is classified as non-critical configuration and no output is displayed. If the damping solutions are above the stable region, a three-axis graphical file is generated which can display the damping solutions vs. Mach numbers and altitudes, as the one shown in Part 3 of Figure 2.4. The regions in the graphical display where the damping solutions exceed the LCO region are highlighted. A similar display for the frequency solution is also generated. It should be noted that since all flutter results generated by the g-method and the ASE analysis are matched-point solutions with true damping values, these results can be directly correlated with the flight test data. The time history shown in Part 3 of Figure 2.4 is a typical output in terms of component loads of the ejection load analysis. Again, only those configurations whose transient loads exceed the specified allowable loads are displayed. The corresponding region which exceeds the allowable loads will also be highlighted in the display.

2.2.3 Store-Aircraft Finite Element Modal Analysis Adopting the MSM System

To generate structural finite element models of massive number of aircraft/store configurations is a very time consuming task. However, the massive store management (MSM) system can be adopted to also automatically generate the finite element models. This is very similar to, but simpler than the UAIC matrix assembly process. While saving the UAIC submatrices, the finite element models of each store including the grid locations, connectivity and material properties are also saved on the database. For a given aircraft/store configuration, the MSM system retrieves all the store finite element models from the database and attaches them to the aircraft finite element model, then subsequently launches a finite element analysis. The output of this analysis will be directly imported to the ZAERO/3-D spline module for an aeroelastic analysis.

2.2.4 Design of a Database for the MSM System

The ZAERO/ZDM module (ZONA Dynamic Memory and database management system) will be adopted as the basic database management system for the MSM system. Among many other features, the ZDM has two data entity managers that are especially important to the efficiency of the MSM system.

Matrix Entity Manager

The matrix entity manager is designed to store and retrieve very large, often sparse, matrices. It minimizes disk storage requirements while allowing algorithms to be developed that can perform matrix operations of virtually unlimited size.

Relational Entity Manager

Relational entities are essentially tables. Each relation has data stored in rows (called entries) and columns (called attributes). Each attribute is given a descriptive name, a data type, and constraints on the values that the attributes may assume (i.e., integer, real or character data). These definitions are referred to as the schema of the relation.

Clearly, the minimum disk storage capability of the matrix entity manager not only increases the efficiency of saving and retrieving matrices, but also reduces the required disk size of the computer.

The relational entity manager can be used as a file system manager. For instance, the "*store label*" can be defined as an attribute in a relational data entity. The data addresses in the database of the UAIC matrices and the finite element models can be stored in other attributes. Once the relational data entity is established, the data address of each store in the database can rapidly be located and subsequently retrieved by the matrix entity manager.

SECTION 3

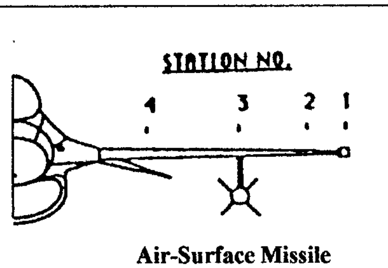
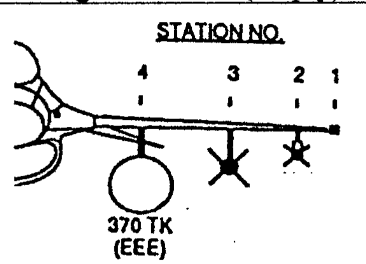
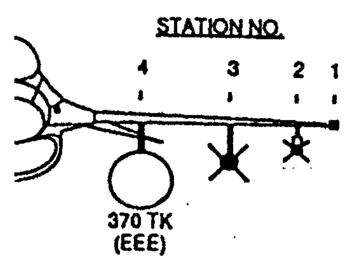
SELECTED TEST CASE DATA

3.1 Flight Test Data

Three F-16 with store configurations adopted from Ref 1 are selected as the test cases of the proposed software system. Reference 1 described that the aircraft is an F-16A, tail number 80-0573. This aircraft is a Block 15 F-16 modified for flutter testing. The store configurations and their associated F-16 weapon-carriage stations are presented in Table 3.1. A more detailed store mass properties and store attachment reference points are given in Tables 3.2 and 3.3. These data are taken from Ref 1 and used in the present work as the basis for modeling the structural finite element data and aerodynamic panel of the three configurations.

According to Ref 1, the three store configurations experienced different aeroelastic instabilities in flight tests; classified by Ref 1 as classical flutter, typical LCO and non-typical LCO. The measured flight test response for these cases are given in Figs 3.1-3.3. These data are also adopted from Ref 1 and used in the present work to correlate the numerical predictions with the flight test data. Because of their distinct aeroelastic instabilities, these three store configurations are the ideal test cases of the present procedure.

Table 3.1 Store Configurations.

Sta. No.	Aeroelastic Response Type		
	Case 1 Classical Flutter	**Case 2 Typical LCO**	**Case 3 Non-typical LCO**
1	LAU-129/A launcher	LAU-129/A launcher	16S210 launcher
2	Empty Station	LAU-129/A launcher AIM-9L missile	LAU-129/A launcher AIM-9L missile
3	Launcher/pylon Air-surface missile	Launcher/pylon Air-surface missile	Launcher/pylon AIM-120A missile
4	Empty Station	Pylon 370-gal fuel tank (empty)	Pylon 370-gal fuel tank (empty)
Front View			

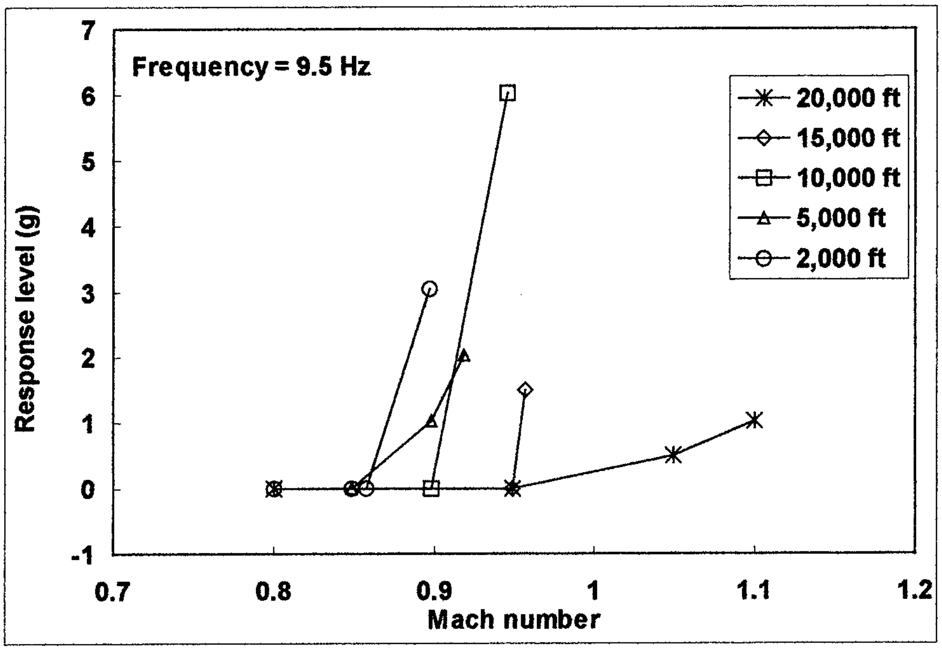


Figure 3.1 Measured Oscillatory Wingtip Response of Flight Test for Classical Flutter Configuration.

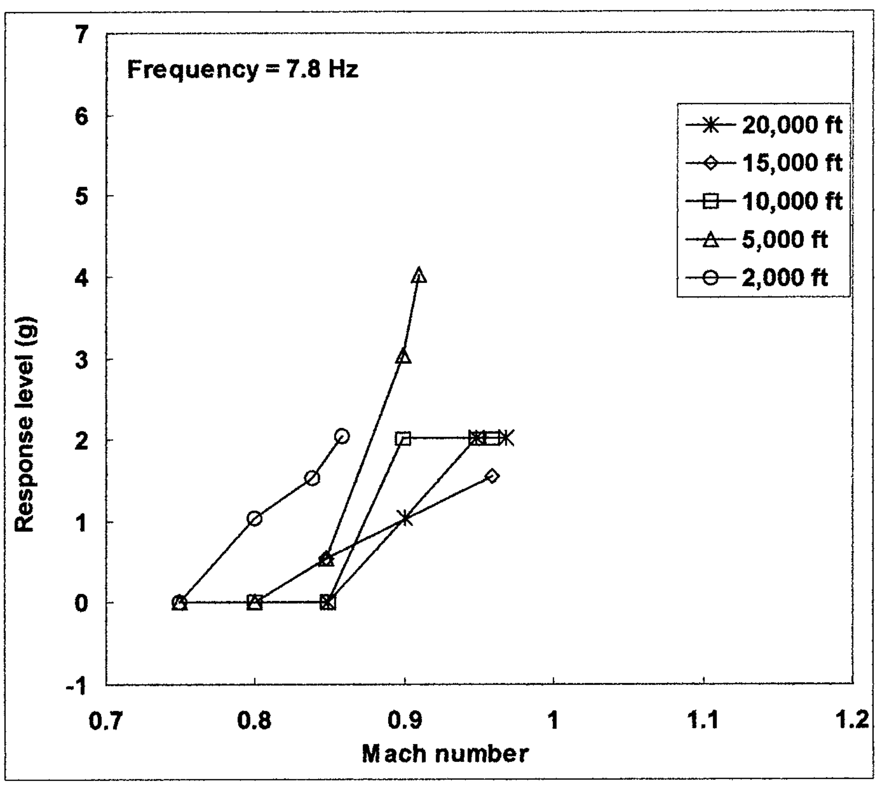


Figure 3.2 Measured Oscillatory Wing Tip Response of Flight Test for the Typical LCO Configuration.

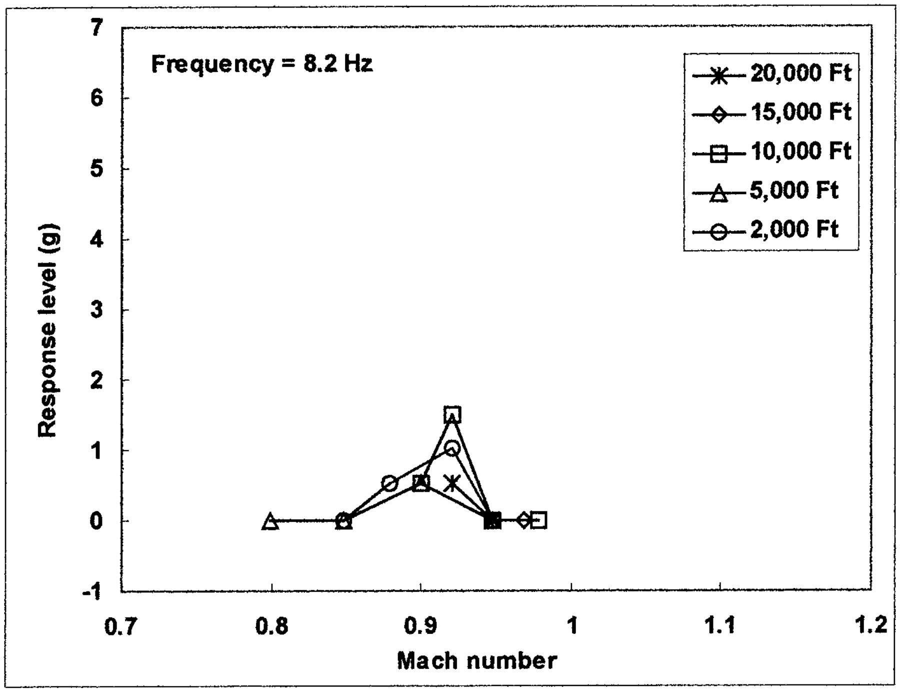


Figure 3.3 Measured Oscillatory Wing Tip Response of Flight Test for the Non-Typical LCO Configuration.

Table 3.2 Store Mass Properties (Taken from Reference 1).

Store	Weight (lbs)	Center of Gravity x, in	y, in	z, in	Moment of Inertia, slug ft^2 Roll	Pitch	Yaw
Air-surface missile	502.0	-14.58	0.00	-25.00	1.76	139.87	140.00
AIM-9L missile	200.0	-21.10	0.00	-17.50	0.42	51.00	51.00
AIM-120 missile	345.0	-14.73	0.00	-25.00	0.65	96.65	96.59
LAU-129/A wing tip launcher	88.0	-13.72	2.88	0.00	-	13.86	13.86
LAU-129/A underwing launcher	88.0	-13.72	0.00	-14.50	-	13.86	13.86
16S210 wingtip launcher	69.0	-15.28	3.60	0.00	-	11.68	11.68
Launcher/Pylon	138.0	-3.60	0.00	-11.00	1.46	14.35	13.55
370-gal fuel tank (empty)	438.5	-8.37	0.00	-18.22	17.12	176.11	165.69

Table 3.3. Store Attachment Reference Points (Taken from Reference 1)

Station	Location	Type	*x*, in	*y*, in	*z*, in
1	Wing Tip	Missile	380.46	180	0
2	Underwing	Missile	375.72	157	0
3	Underwing	Weapon	349.67	120	0
4	Underwing	Fuel Tank	325.40	71	0

3.2 Overall Computational Strategy

To investigate the influence of store configurations on the aeroelastic instability and, more importantly, to study the differences between the classical flutter, typical LCO and non-typical LCO, a number of aeroelastic instability analysis were conducted in the present work as follows:

(1) Three structural finite element models of the F16/store as described in Table 3.1 are used.
(2) For each of the three cases above, three aerodynamic models were used including the wing with tip launcher, the whole aircraft without store, and the whole aircraft with stores.
(3) Two flutter calculation procedures were conducted using linear and nonlinear unsteady aerodynamic methods.
(4) The calculations were performed to two structural dynamic models: the structural models with and without rigid body modes.
(5) The flutter results were presented based on two structural damping assumptions : g = 0% and g=1.0 %.
(6) To investigate the correlation of the flutter calculations with the flight test data, the flutter results were presented for five altitudes, including sea level, 5 kft, 10 kft, 15 kft, and 20 kft.

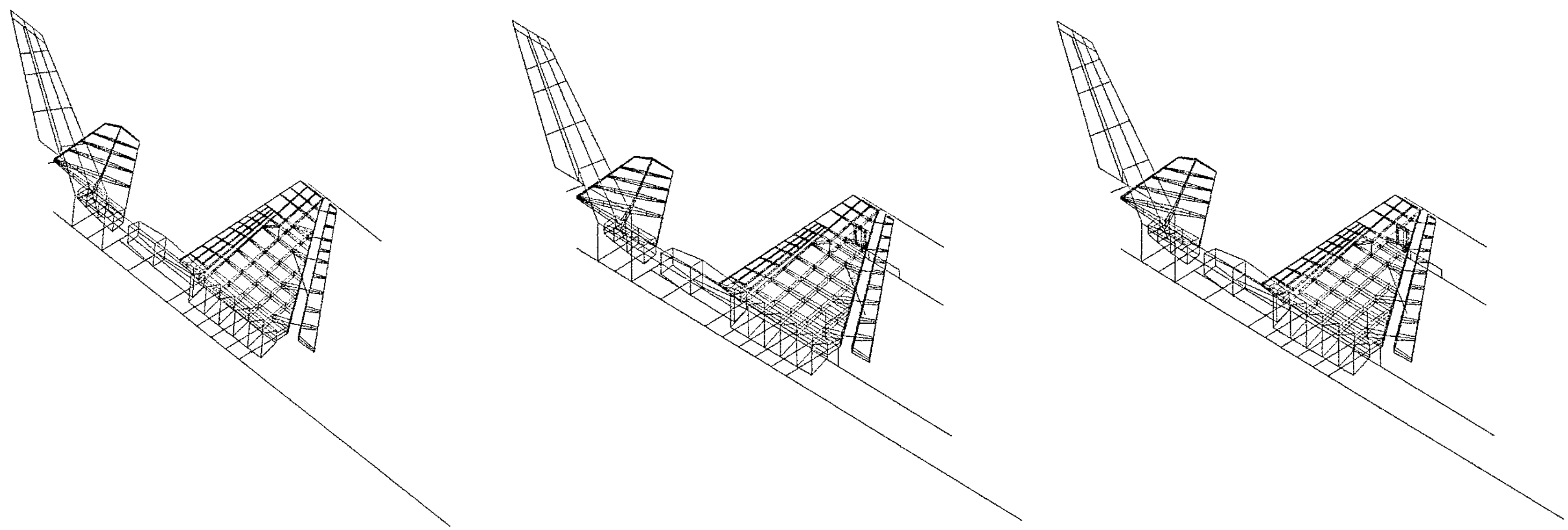
3.3 Structural Finite Element Data

The structural finite element model for each of the three cases is shown in Fig 3.4. Symmetric modes were not considered in the present analysis since the it was known from the flight test results that the actual instability were anti-symmetric. However, the computational codes, including MSC/NASTRAN and ZAERO, are applicable to a more general case, *i.e.* symmetric, anti-symmetric and asymmetric configurations.

The natural frequencies for the whole aircraft with stores of each case are given in Table 3.2. The NASTRAN data needed to generate the natural frequencies and mode shapes are given in Appendices A, B, and C for the classical flutter, typical LCO and non-typical LCO cases, respectively. These natural frequencies and mode shapes are used in the present flutter/LCO predictions as described in the next three sections.

Table 3.4 Natural Frequencies of F-16A (with Rigid Body Modes).

Mode Shape	Natural frequency (Hz)		
	Case 1 Classical Flutter	Case 2 Typical LCO	Case 3 Non-typical LCO
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	9.01	7.74	8.16
5	9.91	8.10	8.36
6	12.03	9.77	10.71
7	12.20	10.93	11.58
8	13.61	11.97	12.60
9	15.69	12.42	13.99
10	17.41	13.74	14.84
11	20.71	15.19	15.52
12	29.59	17.23	17.70
13	29.76	19.53	19.90
14	33.94	22.19	22.44
15	36.45	24.00	23.93
16	39.68	26.09	26.60
17	41.79	29.75	29.96
18	44.05	30.55	31.72
19	44.92	31.58	32.36



(a) (b) (c)

Figure 3.4 Finite Element Model of F16A – (a) Classical Flutter Case (b) Typical LCO Case, (c) Non-typical LCO Case.

3.4 Aerodynamic Model

Three aerodynamic models (Figure 3.5) are generated for each of the three F16/store configurations as follows:

- Model 1 : Wing with tip launcher only
- Model 2 : Whole aircraft without under stores
- Model 3 : Whole aircraft with stores.

The aerodynamic influence coefficient is calculated based on two different methods: linear and nonlinear unsteady aerodynamics. The linear aerodynamic methods are ZONA6 and ZONA7 for subsonic and supersonic flows, respectively. The nonlinear aerodynamic method is ZONA Transonic Aerodynamic Influence Coefficient (ZTAIC) method. These three aerodynamic codes are the essential parts of ZAERO to generate the AIC of the whole configurations, including fuselage, wing, empenage and stores.

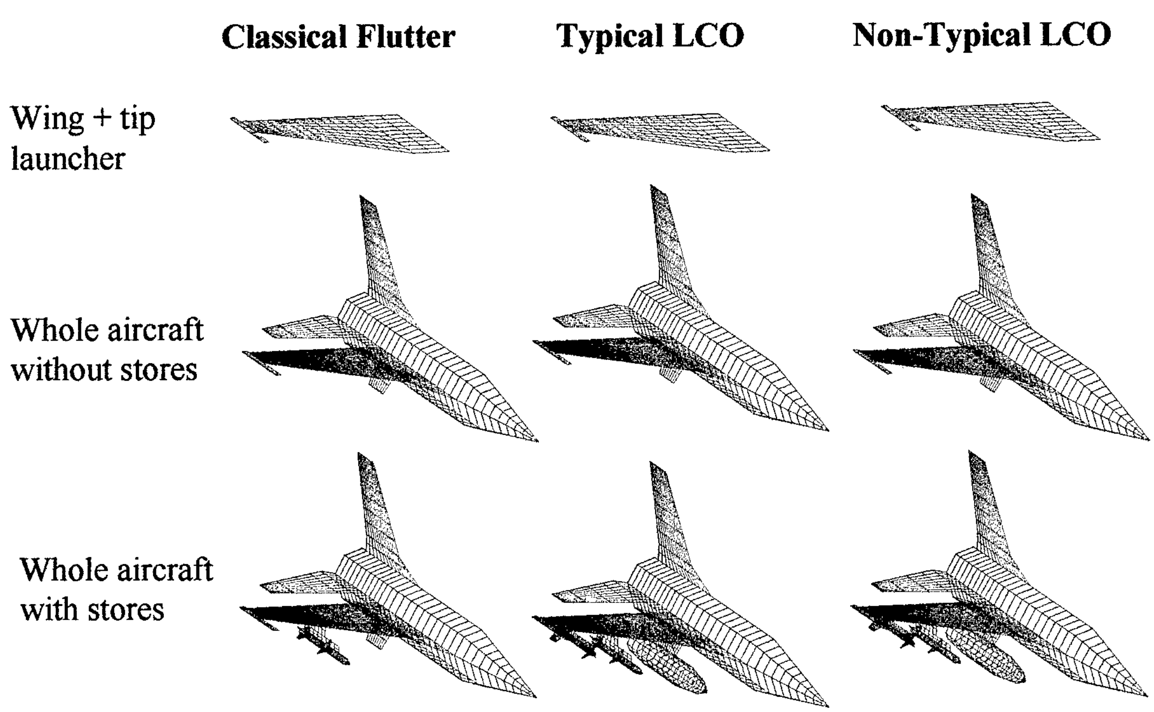


Figure 3.5 Aerodynamic Models of F-16/Store

3.5 Steady Transonic Aerodynamic Data

The steady transonic aerodynamic data in the present work was supplied by Denegri of Eglin Air Force Base for five Mach numbers, including M = 0.8, 0.90, 0.95, 0.98, and 1.05. The pressure distribution for the wing lower and upper surfaces of each Mach number are shown in Figure 3.6.

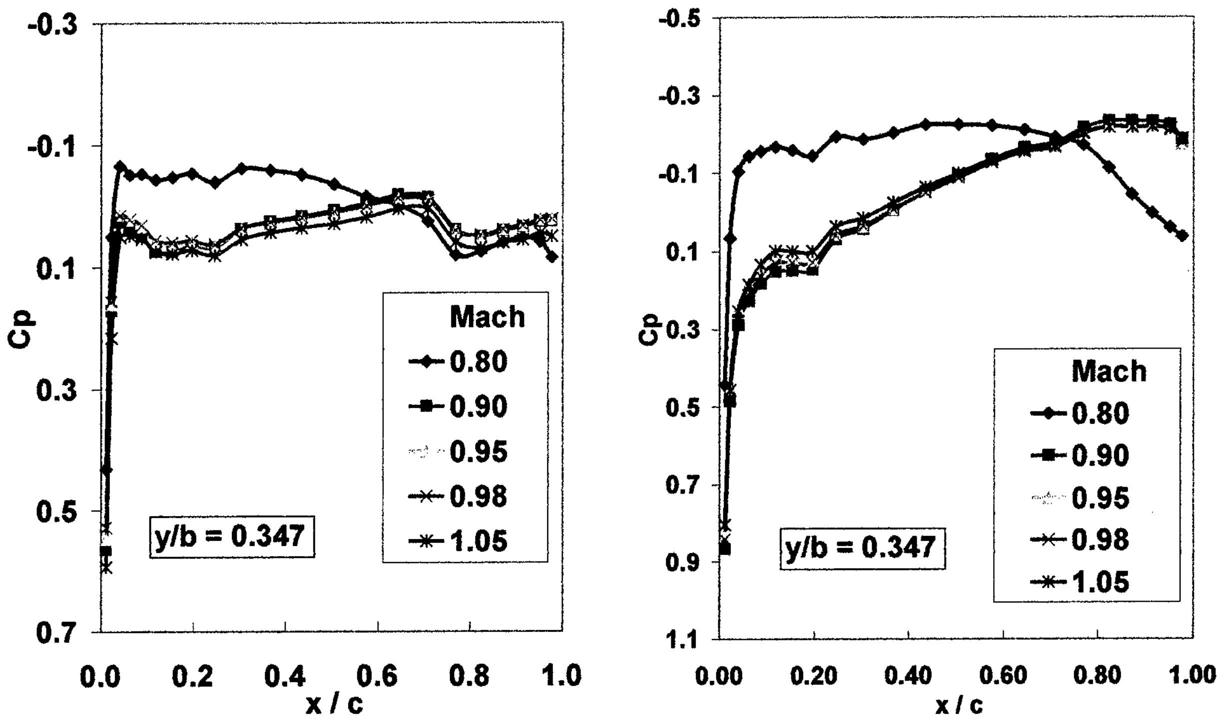


Figure 3.6a Cp Distribution at y = 0.347 b.

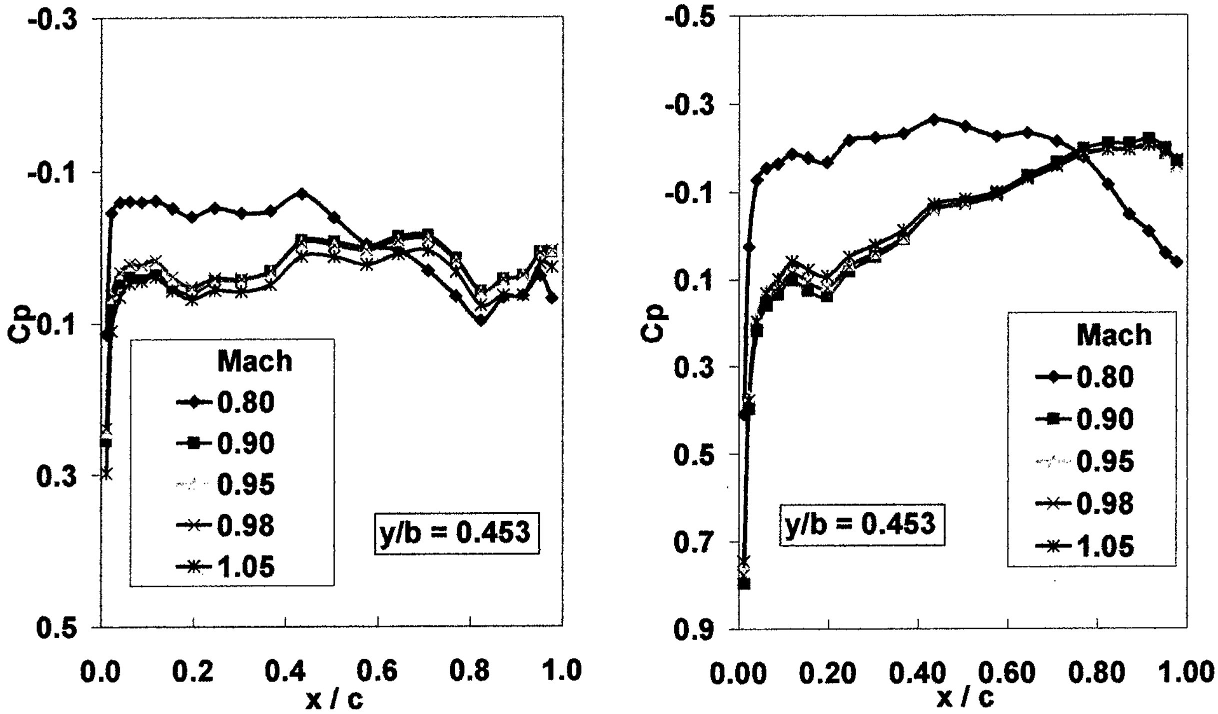


Figure 3.6b Cp Distribution at y = 0.453 b.

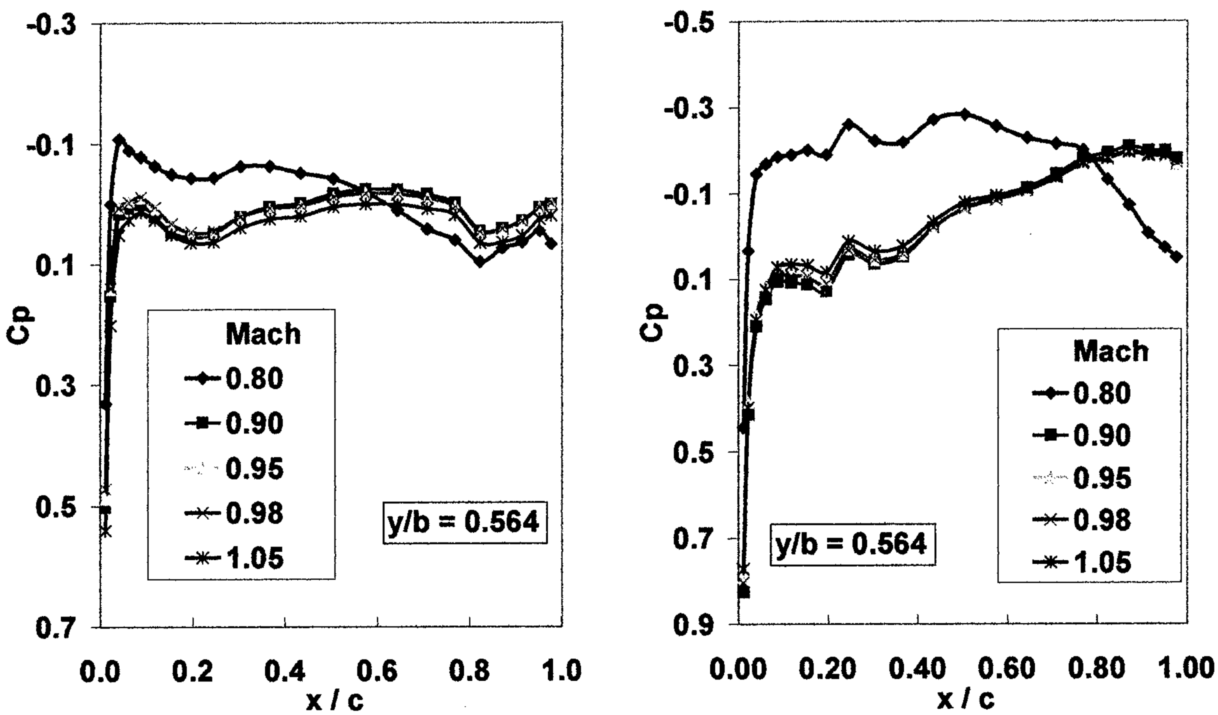


Figure 3.6c Cp Distribution at y = 0.564 b.

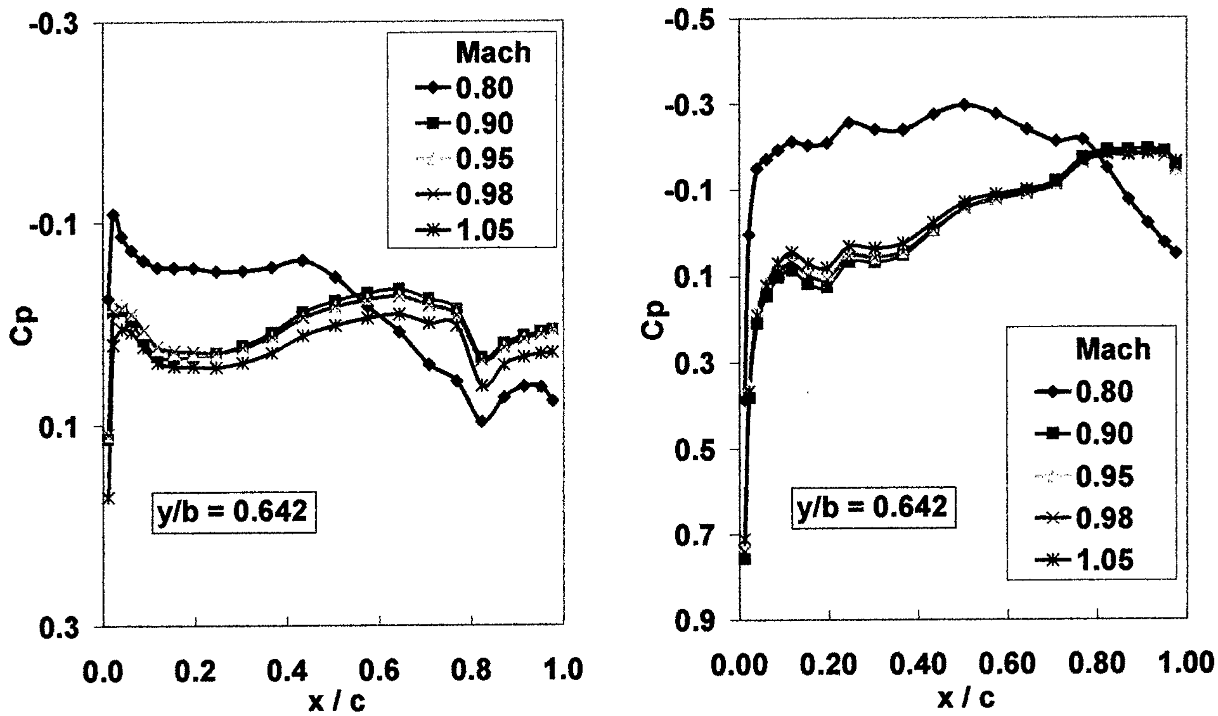


Figure 3.6d Cp Distribution at y = 0.642 b.

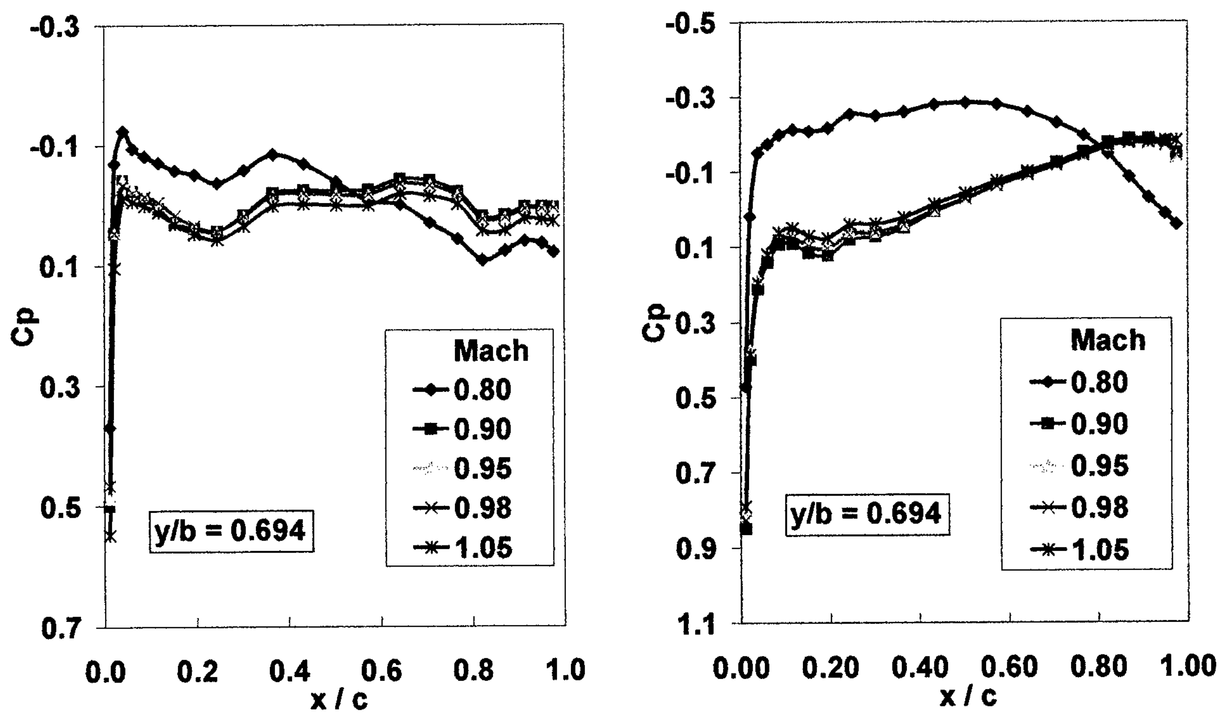


Figure 3.6e Cp Distribution at y = 0.694 b.

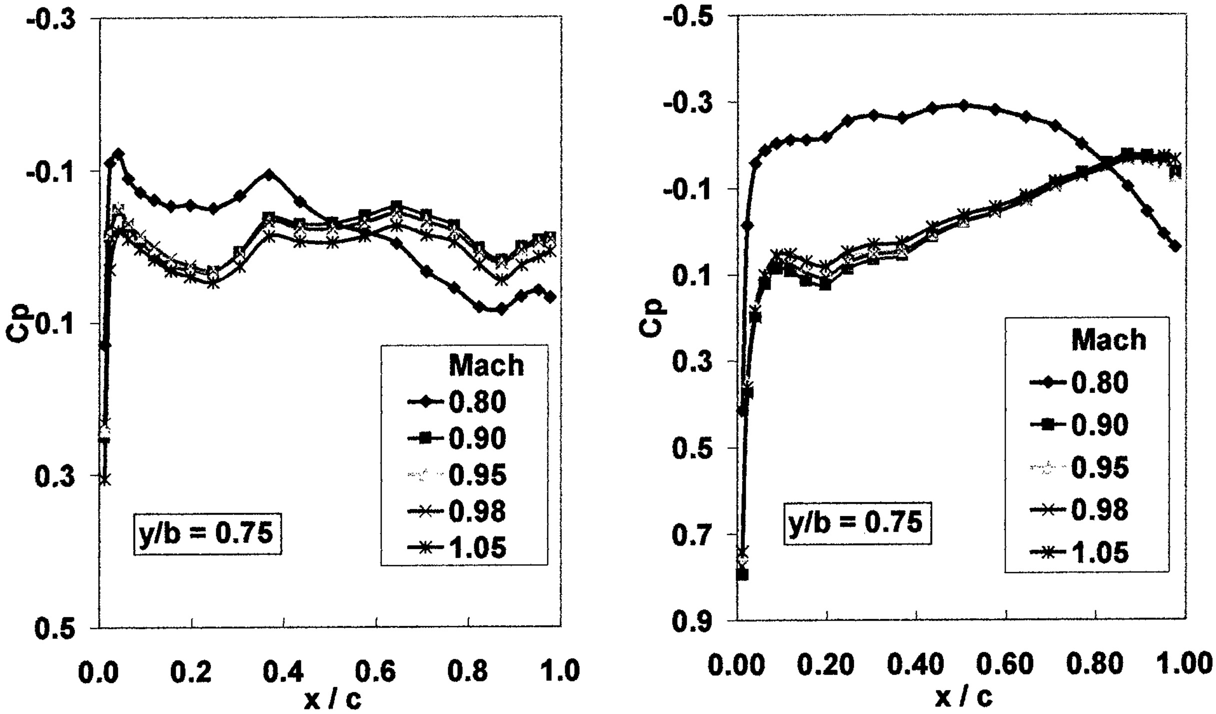


Figure 3.6f Cp Distribution at y = 0.75 b.

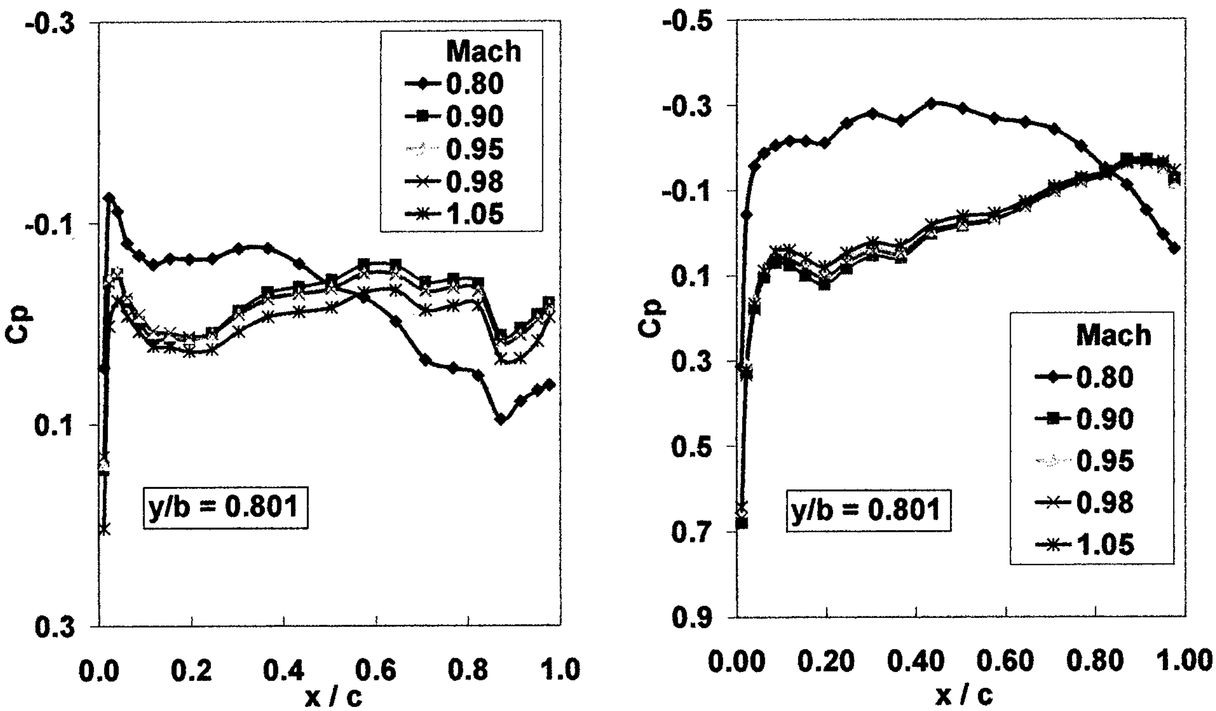


Figure 3.6g Cp Distribution at y = 0.801 b.

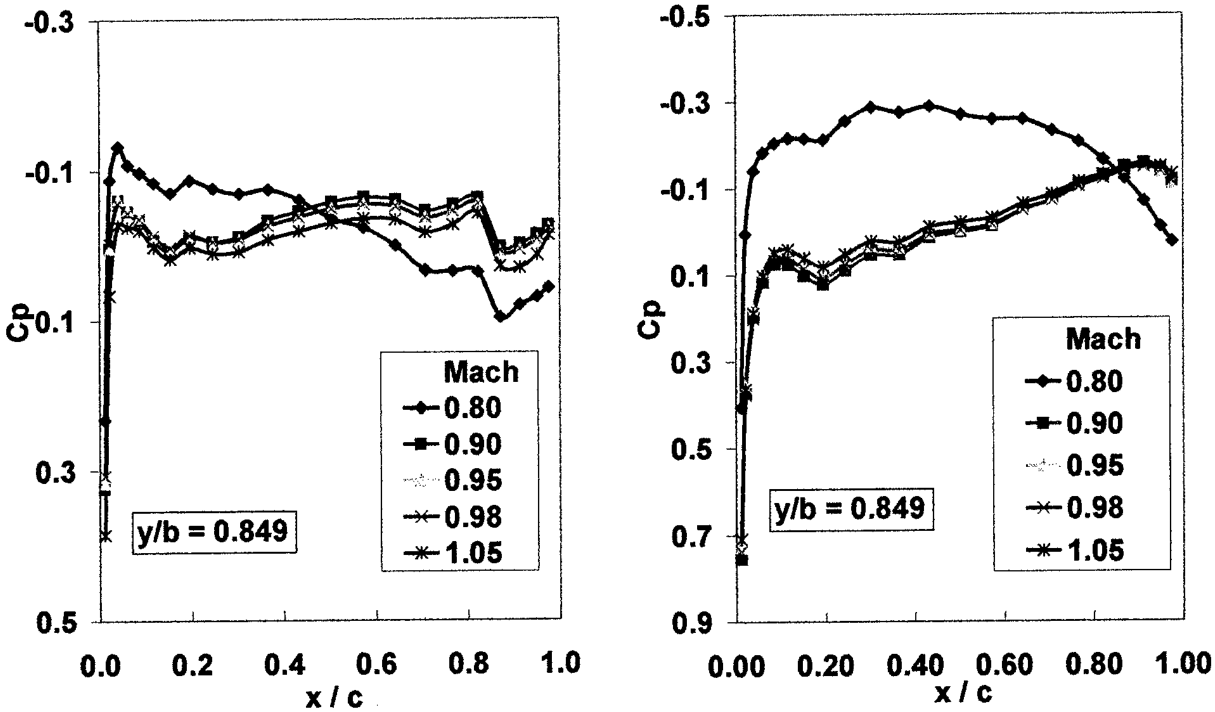


Figure 3.6h Cp Distribution at y = 0.849 b.

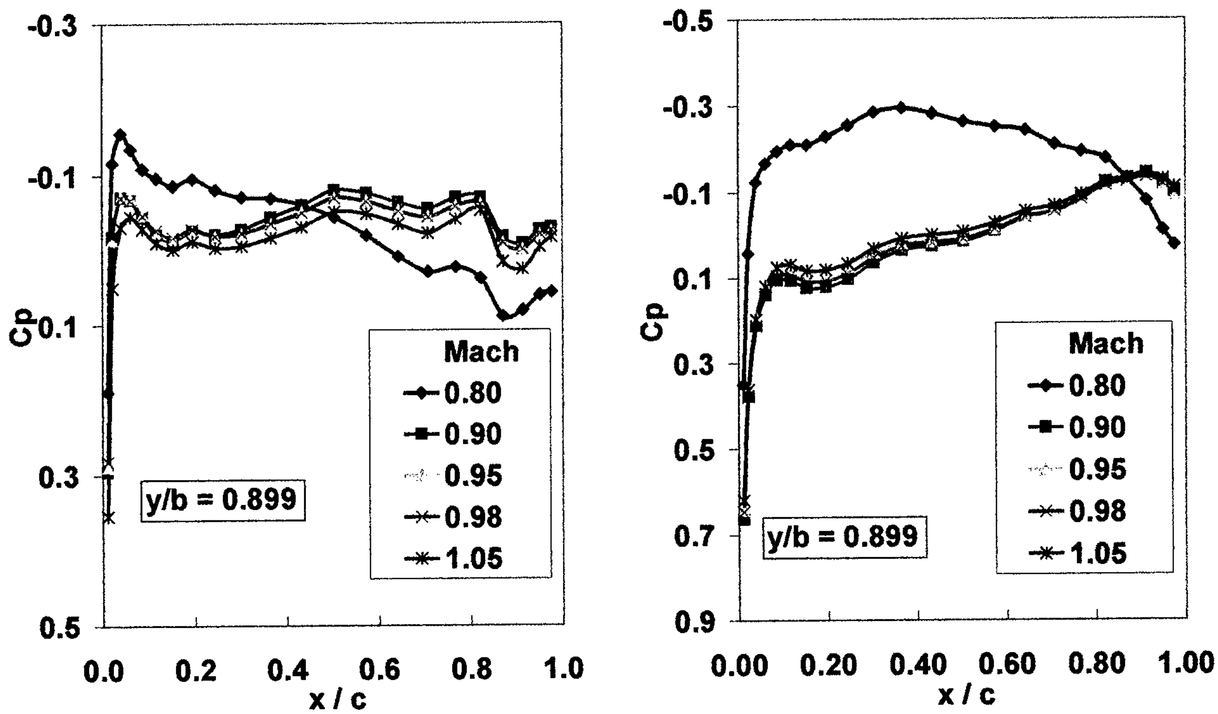


Figure 3.6i Cp Distribution at y = 0.899.

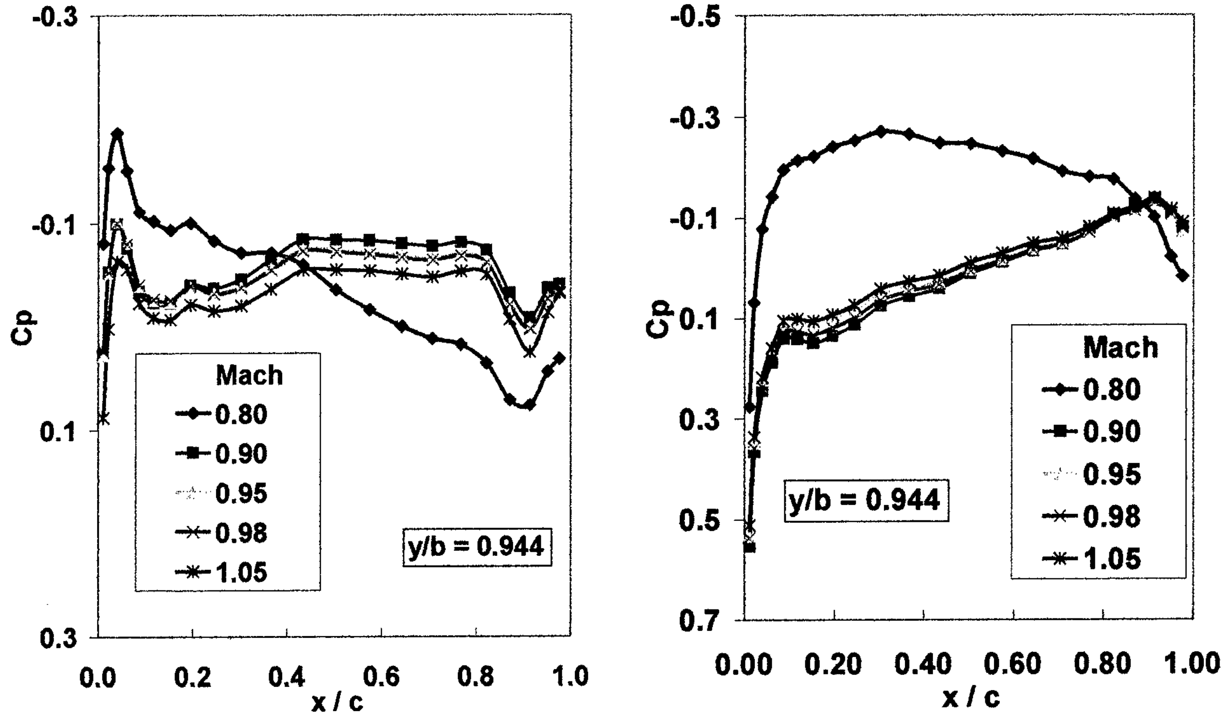


Figure 3.6j Cp Distribution at y = 0.944 b.

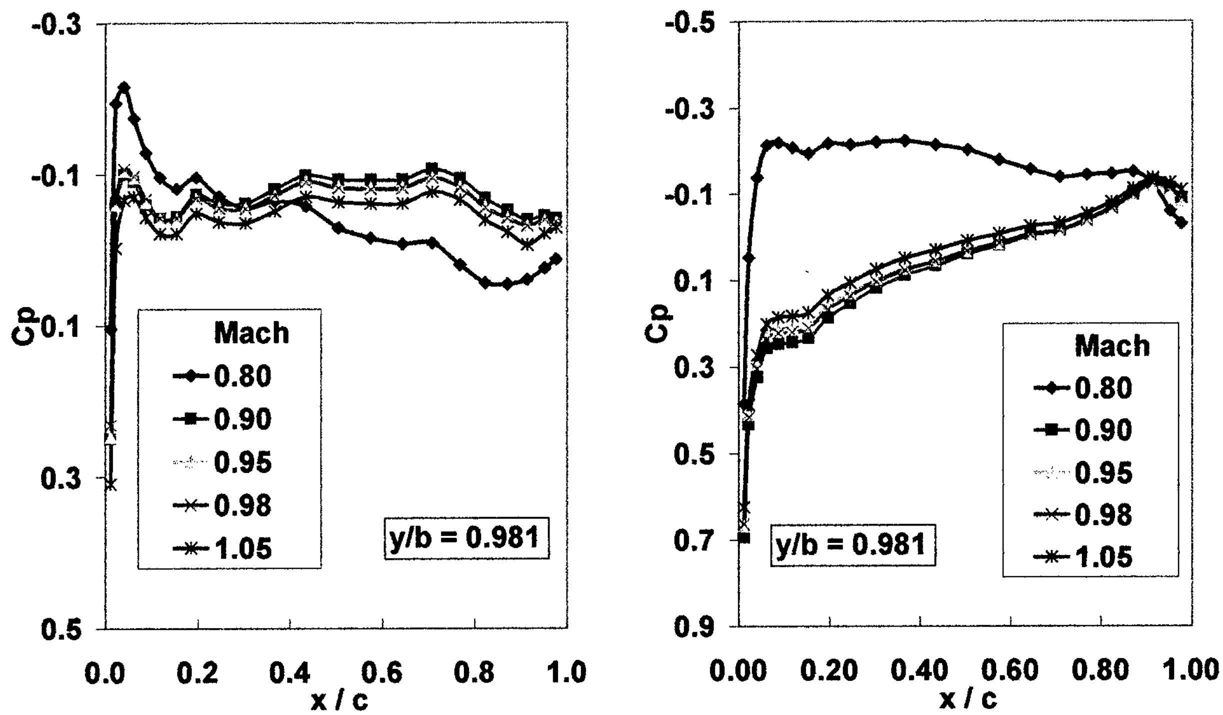


Figure 3.6k Cp Distribution at y = 0.981 b.

SECTION 4

CORRELATION OF THE F-16 / STORE CLASSICAL FLUTTER PREDICTIONS WITH FLIGHT TEST DATA

4.1 Flight Test Result and Previous Numerical Prediction

Reference 1 described that a classical flutter instability occurred during the flight test of F-16 with the air-surface missiles at Station 3 and LAU-129/A launcher at the wing tip (Figure 3.1). The instability response was characterized by a sudden onset of high–amplitude wing oscillations. The measured oscillatory wing tip response during level flight at five altitude is shown in Fig 3.1. At 10,000 ft altitude and level flight, no significant structural responses occurred between Mach 0.80 and 0.90, but a rapid onset of high amplitude anti-symmetric oscillations was encountered at Mach 0.95 and frequency of 9.5 Hz. Similar behavior was observed for other test altitudes.

An attempt to predict this classical flutter case has been conducted by Denegri in Refs 1 and 18. The calculation was performed at M = 0.90. The aerodynamic model used in Ref 1 and 18 is an isolated wing with tip launcher only, *i.e.* the same as the aerodynamic model #1 of the present work as shown in Fig 4.1. No aerodynamic modeling of fuselage, empenage and underwing stores is included. The only influence of the fuselage, empenage and stores considered in the flutter analysis is their effect on structural modal characteristics. The flutter calculation was conducted using the non-matched method. Two critical speed were found in the calculations. The first critical speed and frequency are V_f = 442 KCAS and $_{ff=}$ 10.17 Hz with a hump-mode type of flutter mode. The second critical speed is at V_f = 745 KCAS and $_{ff=}$ 9.37 Hz with an explosive type of flutter mode (Ref 18). The result indicates that the flight test frequency is well correlated with the second flutter mode frequency. However, the calculated flutter speed was higher than the flight test data.

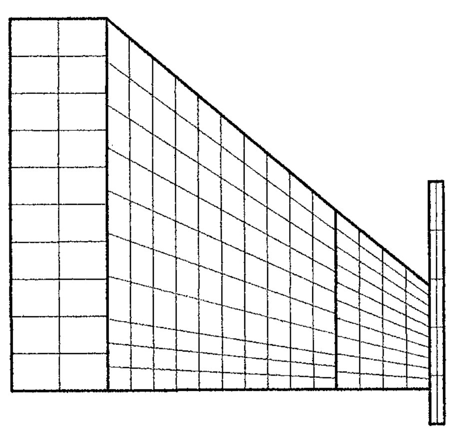


Figure 4.1 Aerodynamic Model #1 for the Classical Flutter Case.

4.2. Linear Aerodynamic Approach

4.2.1 Aerodynamic Model #1

The first aerodynamic model of the present work is the isolated wing with tip launcher (Figure 4.1), *i.e* the same as the model used in Ref 1. Figure 4.2 shows the first four natural (undamped) mode shapes. Employing a non-matched point flutter analysis of ZAERO at M= 0.90 and sea level density, the first critical speed was found to be V_f= 456 KCAS and flutter frequency was f_f = 10.17 Hz (dominated by the third structural mode), and the second flutter speed/frequency was V_f = 752 KCAS / f_f = 9.36 Hz (dominated by the first structural mode). These results are very close to the analysis results in Refs 1 and 18 as shown in Table 4.1 and Fig 4.3. Figure 4.4 shows the flutter mode shape for V_f = 752 KCAS at several time steps. The V-g and V-f plots of the present flutter analysis given in Fig 4.4 show similar results to Fig 12 of Ref 1. Note that Refs 1 and 2 used different numerical procedures for computing the unsteady aerodynamics, i.e. a doublet-lattice method for the unsteady aerodynamic prediction and a Laguerre variation of the classical K-method for the flutter solution.

Table 4.1 Flutter Results Using Linear Aerodynamics at M = 0.9.

Aerodynamic Model or Methods		Flutter Speed (KCAS)	Flutter Frequency (Hz)
Flight test (on set of flutter speed)		585.4	9.5
Denegri's DLM results (Aerodynamic Model #1: Wing + tip launcher only, non matched point)	g = 0%	745	9.37
	g = 1%	807	9.39
Aerodynamic Model #1: Wing + tip launcher only, (non matched point)	g = 0%	752	9.36
	g = 1%	831	9.36
Aerodynamic Model #2: Whole aircraft without underwing stores (matched point)	g = 0%	483	9.56
	g = 1%	517	9.55
Aerodynamic Model #3: Whole aircraft with stores (matched point)	g = 0%	478	9.57
	g = 1%	513	9.55
Aerodynamic Model #3: Whole aircraft with stores but without rigid body modes (matched point)	g = 0%	486	9.56
	g = 1%	522	9.55

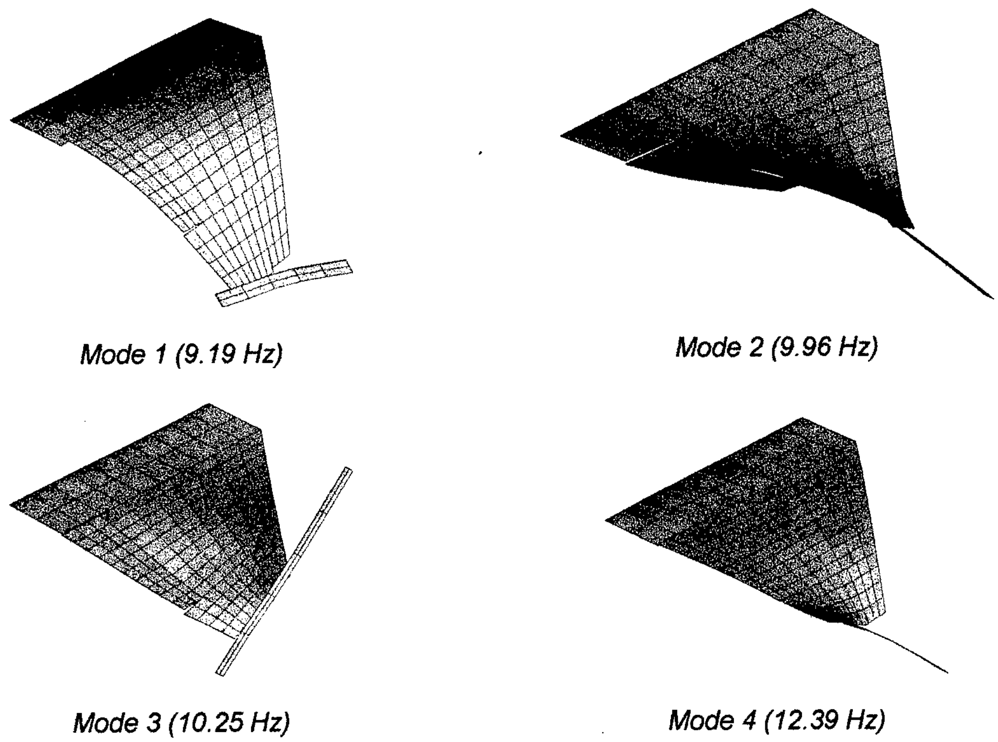


Figure 4.2 Vibration Modes of Aerodynamic Model #1.

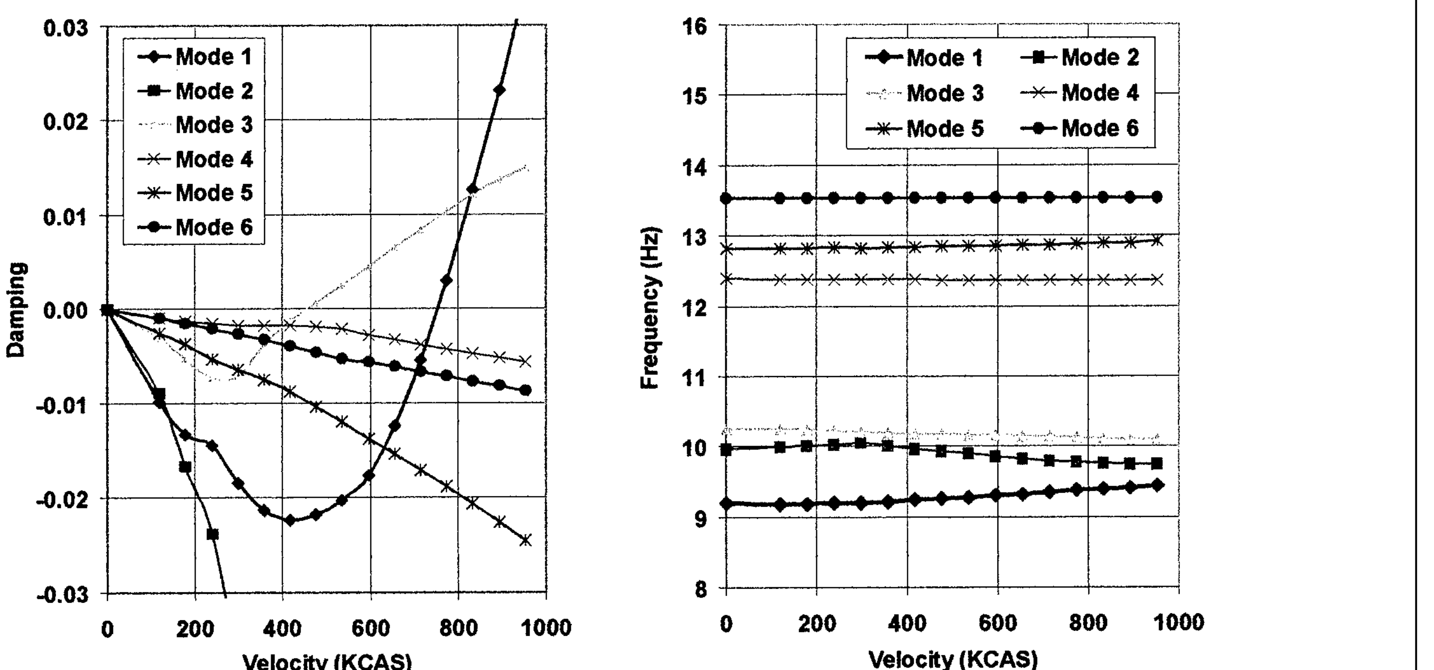


Figure 4.3 The Flutter V-g and V-f plots for Wingtip Launcher only Model at M = 0.9 Using the Linear Aerodynamic Approach.

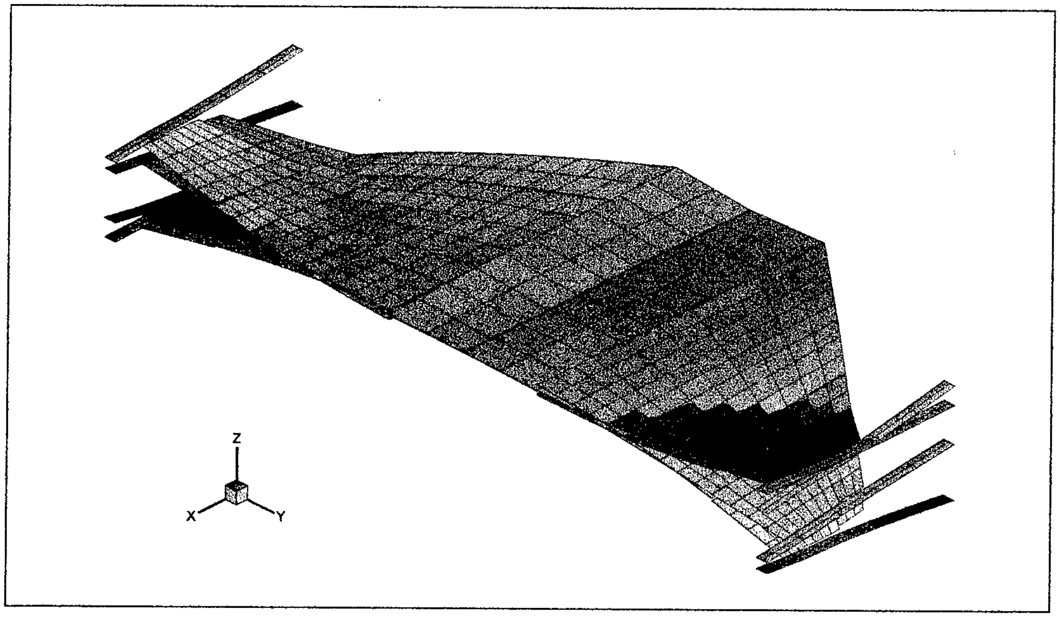


Figure 4.4 The Flutter Mode Shape at V_f = 752 KCAS and f_f = 9.36 Hz of the Wing-Tip Launcher Only Model.

4.2.2 Aerodynamic Model #2

The flutter calculation was repeated using the aerodynamic model #2, i.e. the whole aircraft without underwing stores. The flutter calculation using the matched point method gave the flutter speed/frequency at $V_f = 483$ KCAS / $f_f = 9.56$ Hz. Note that there is no second critical speed in this second model. If the structural damping is assumed to be g = 1.0%, than the flutter speed and frequency becomes $V_f = 517$ KCAS and $f_f = 9.55$ Hz. The result for this configuration shows that the inclusion of the fuselage and empenage aerodynamic model improves the result, i.e. closer to the flight test data.

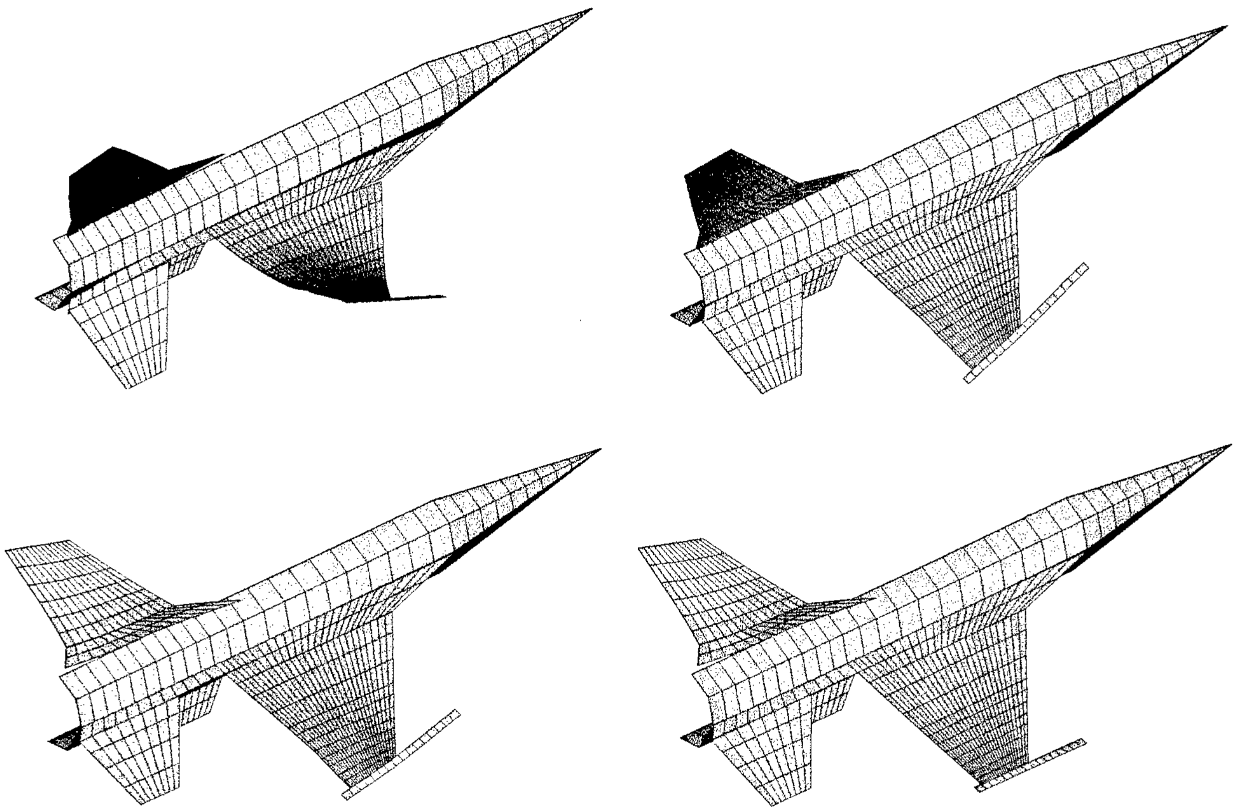


Figure 4.5 Vibration Modes of the Aircraft Model without Underwing Stores

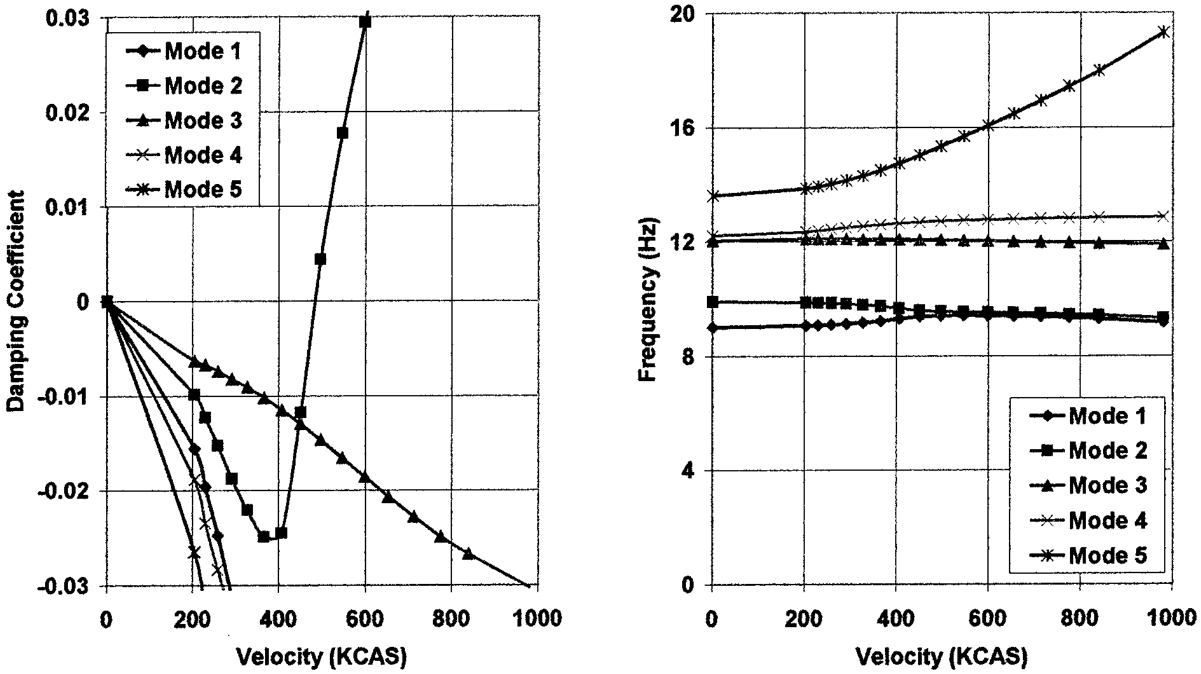


Figure 4.6 The Flutter V-g and V-f Plots for the Whole Aircraft Model without Underwing Stores at M = 0.9 Using the Linear Aerodynamic Approach.

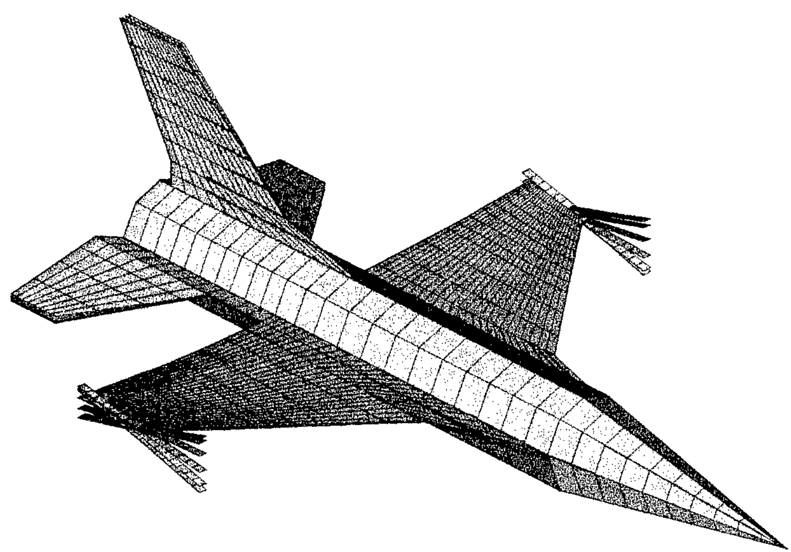


Figure 4.7 The Flutter Mode Shape of the Aircraft Model Without Underwing Stores.

4.2.3 Aerodynamic Model #3, M = 0.90

The flutter calculation was repeated using the aerodynamic model #3, i.e. the whole aircraft with underwing stores. The natural mode shapes are shown in Figure 4.8. The flutter calculation using the matched point method gave the flutter speed/frequency at V_f = 486 KCAS / f_f = 9.56 Hz. Note that there is no second critical speed in this third model. If the structural damping is assumed to be g = 1.0% than the flutter speed and frequency becomes V_f = 522 KCAS and f_f = 9.55 Hz. Clearly, the result for this configuration is closer to the flight test data as shown in Table 4.1.

All of the previous calculations on the classical flutter did not include the structural rigid body modes. If the anti-symmetric rigid body modes are included to the whole aircraft with store model, the similar procedures gave the flutter speed / frequency at V_f = 478 KCAS / f_f = 9.57 Hz for g=0%, and V_f = 513 KCAS / f_f = 9.55 Hz for g = 1.0%. These results are very close to the results of the model without rigid body modes. Therefore, for the classical flutter of the present case, the influence of the rigid body modes is not significant. Figure 4.9 shows the flutter V-g and V-f diagrams for aerodynamic model #3. The flutter modes for several time steps is presented in Fig 4.10.

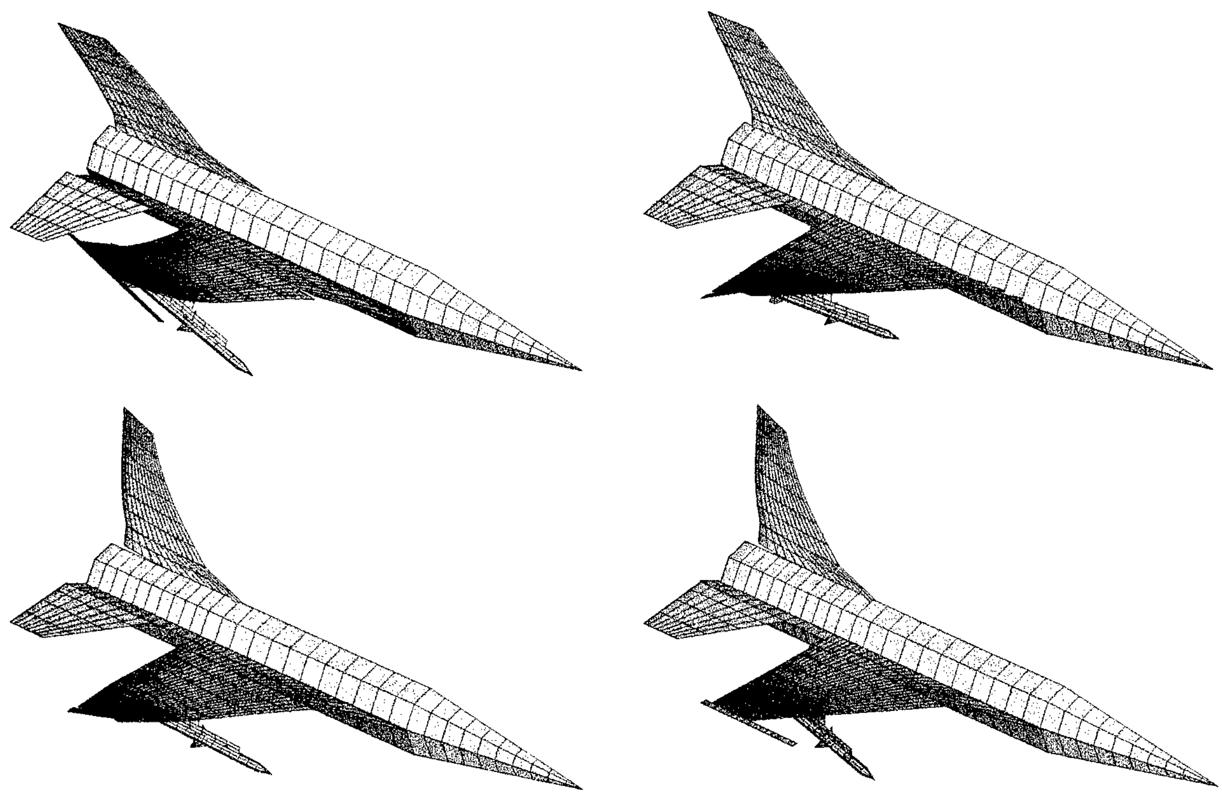


Figure 4.8 Vibration Modes of the Aircraft Model with Underwing Stores

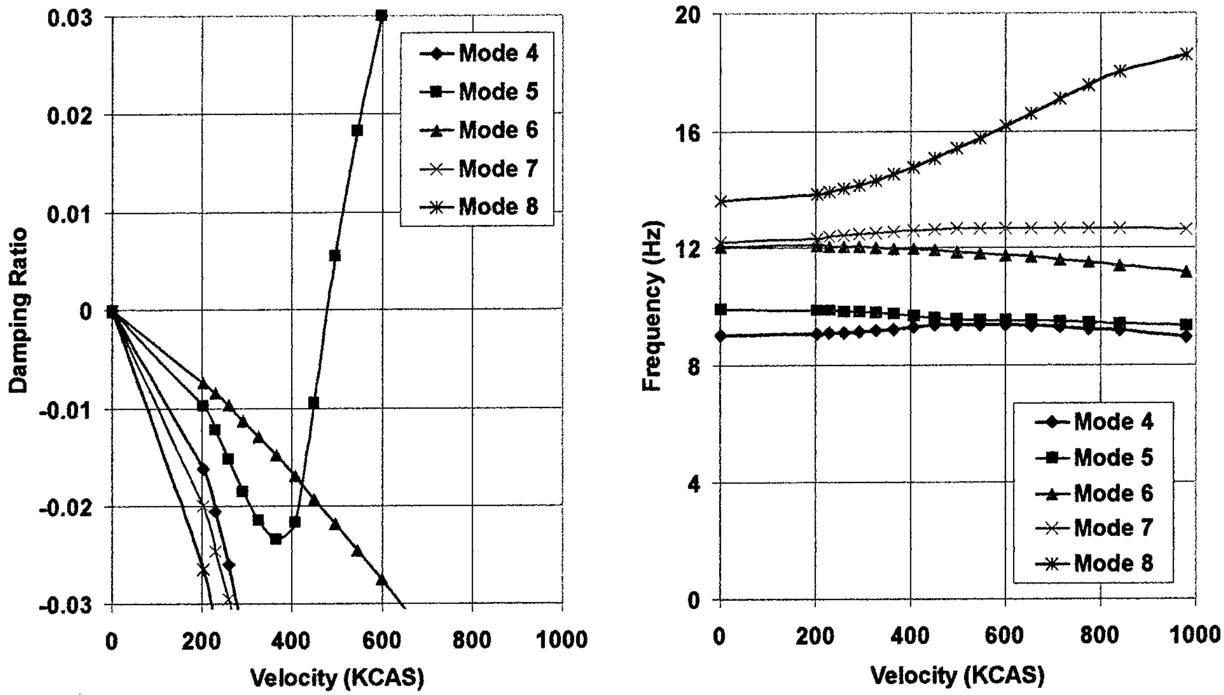


Figure 4.9 The Flutter V-g and V-f plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 using the Linear Aerodynamic Approach.

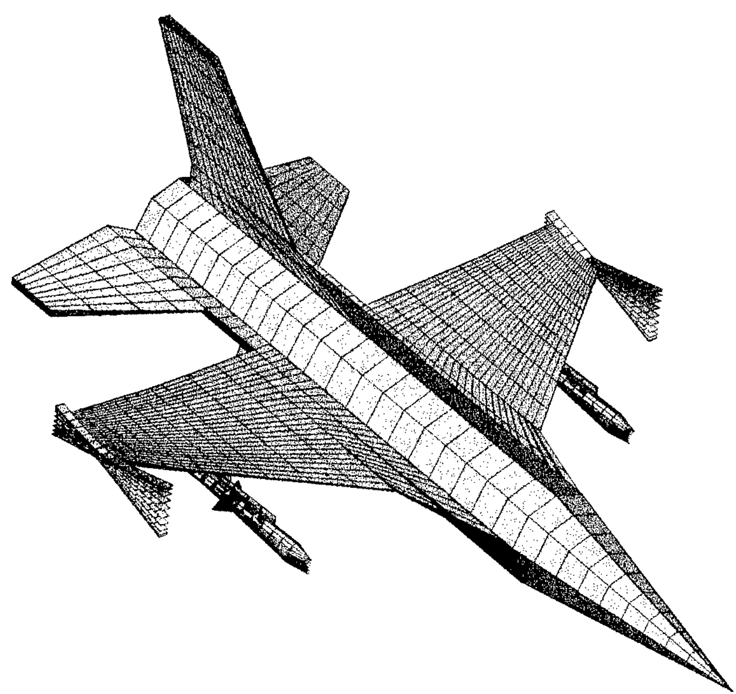


Figure 4.10 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores at M = 0.9.

4.2.4. Aerodynamic Model #3. Mach 0.8 – 1.05

The flutter calculations for M = 0.90 showed improvement on the solution results if a more refined aerodynamic model is used. However, previous results does not give a direct correlation between the flutter prediction and the flight test data. Note that, to indicate the flutter onset, the flight test data presents the measure acceleration response level in terms of Mach numbers and altitudes. Therefore, in order to correlate the numerical predictions with the flight test data, the calculation was repeated for several Mach numbers, including M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient as a function of Mach number for each altitude as shown in Fig 4.11. Note that the correlation of the flutter prediction with the altitude is automatically generated by using the matched point option of the g-method.

The critical speed and frequency are given in Table 4.2. The results presented in Fig 4.11. shows that

- Linear aerodynamic approach (ZONA6/ZONA7) predicts explosive damping of the unstable mode in all altitudes.
- For the altitude lower than 15,000 ft, the flutter onset Mach number of the flight test data was correlated very well with the linear aerodynamic approach if the structural damping is assumed to be 1%.
- For altitudes of 15,000 ft and higher, the onset Mach number of the flight test data occurred near M = 0.98 and 1.02 where the nonlinearity effect of the transonic aerodynamic is significant. Therefore, the linear aerodynamic approach gives a higher prediction of the onset Mach number for these altitudes.

Table 4.2 Critical Speed and Frequency Using the Linear Aerodynamic Approach (ZONA6/ZONA7)

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	485	9.58
	1.0	521	9.56
0.90	0.0	486	9.56
	1.0	522	9.55
0.95	0.0	479	9.56
	1.0	515	9.55
0.98	0.0	500	9.58
	1.0	556	9.58
1.05	0.0	490	9.58
	1.0	517	9.58

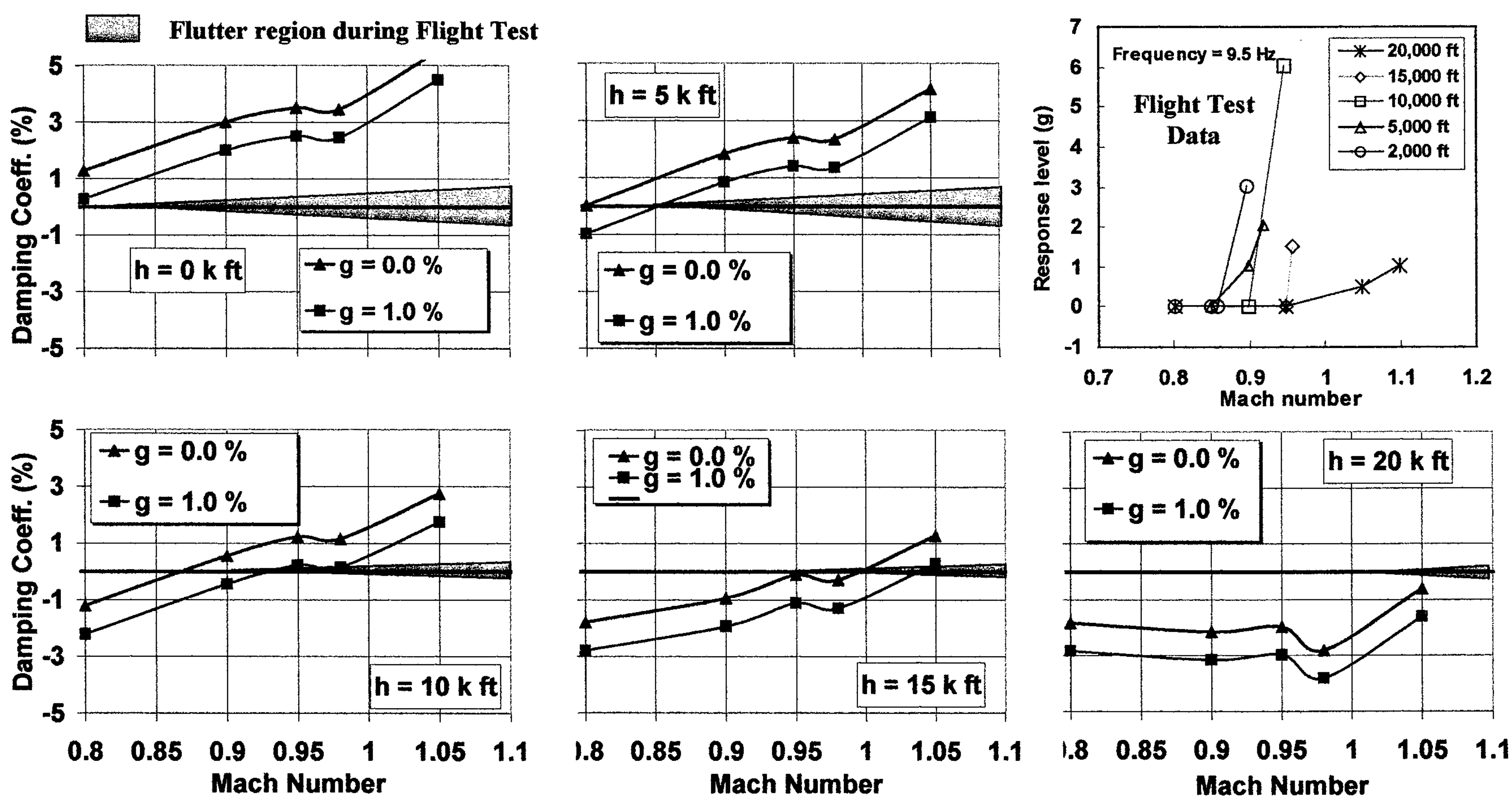


Fig 4.11 Correlation between the Flutter Prediction using the Linear Aerodynamic Approach (ZONA6/ZONA7) with Flight Test Data of the Classical Flutter Case.

4.3 Nonlinear Aerodynamic Approach

The flight test for the classical flutter configuration indicated that the aeroelastic instability for this case occurred between 0.85 and 1.1, *i.e.* in transonic regime where the nonlinear behavior of the aerodynamic flow may significantly influence the critical speed. To investigate the flutter calculation in this transonic regime, a nonlinear aerodynamic approach based on the ZTAIC method was used for the prediction of the unsteady aerodynamic data. The steady aerodynamic data was provided by Dr. Charles Denegri of Eglin Air Force Base as shown in Section 3. The flutter calculation was conducted for the whole aircraft with stores. Mach numbers ranged from 0.80 to 1.05. Rigid body modes were included in the structural dynamic calculations.

4.3.1 Aerodynamic Model #3 at M = 0.90

The flutter calculation for M = 0.90 using the matched point method gave the flutter speed/frequency at $V_f = 501$ KCAS / $f_f = 9.58$ Hz. Note that there is no second critical speed in this third model. If the structural damping is assumed to be g = 1.0%, the flutter speed and frequency becomes $V_f = 538$ KCAS and $f_f = 9.56$ Hz. Compared to the results based on the linear aerodynamic approach given in Table 4.1, the present result using the nonlinear aerodynamic approach is closer to the flight test data. Figure 4.12 shows the V-g and V-f plot for Mach 0.90. The associated flutter mode is presented in Fig 4.13.

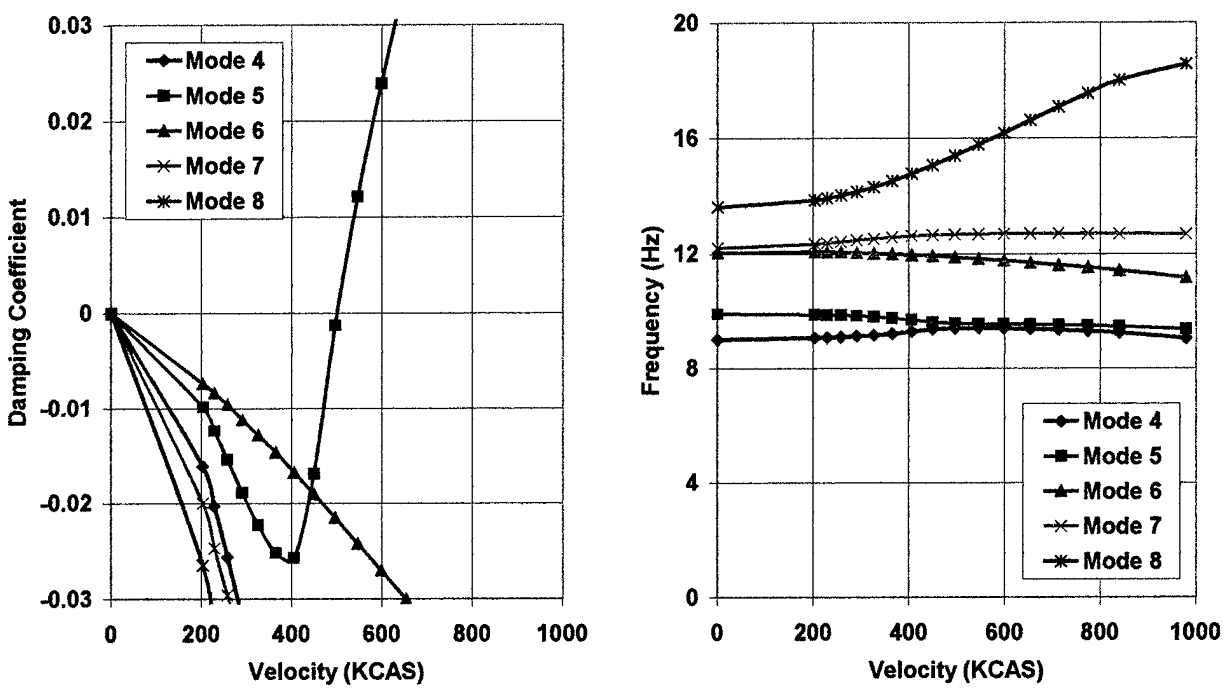


Figure 4.12 The Flutter V-g and V-f plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using The Nonlinear Aerodynamic Approach.

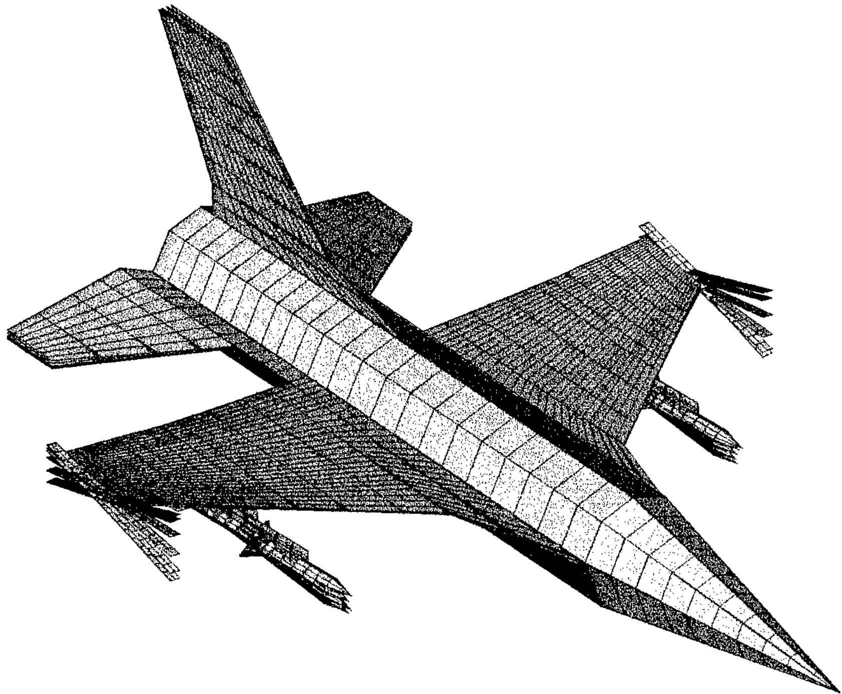


Figure 4.13 The Flutter Mode Shape of The Whole Aircraft Model with Underwing Stores at M = 0.9 Calculated Using The Non-Linear Aerodynamic Method.

4.3.2 Aerodynamic Model #3 at M = 0.80 – 1.05

In order to correlate the numerical predictions with the flight test data, the calculation for the nonlinear aerodynamic approach was repeated for several Mach numbers, namely M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient and Mach number as well as the altitudes. The critical speed and frequency for each Mach number are given in Table 4.3. The results presented in Fig 4.14. shows that:

- ZTAIC, i.e. the nonlinear aerodynamic approach, predicts explosive damping of the unstable mode in all altitudes.
- In the post-flutter region, the non-linearity induced stable damping (from either structures or aerodynamics) can not nullify the explosive unstable damping, leading to flutter.
- ZTAIC results indicate that the onset of flutter is very sensitive to the linear structural damping.
- Overall, ZTAIC predicts the flutter onset Mach number better than the linear aerodynamic approach for all altitudes.

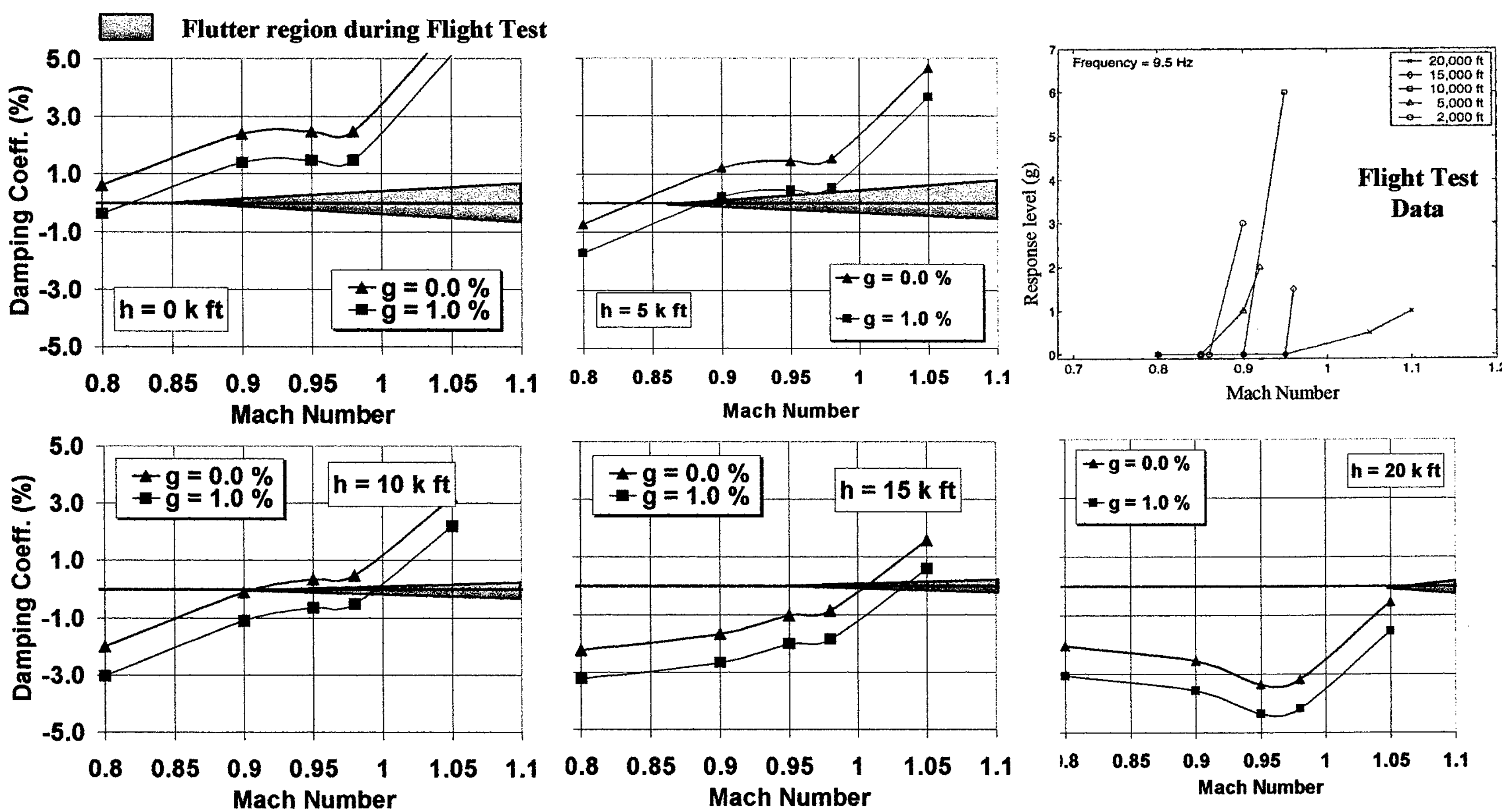


Figure 4.14 Correlation between the Flutter Prediction using the Nonlinear Aerodynamic Approach (ZTAIC) and the Flight Test Data.

Table 4.3 Critical speed and Frequency Using the Nonlinear Aerodynamic Approach (ZTAIC).

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	511	9.61
	1.0	549	9.60
0.90	0.0	501	9.58
	1.0	538	9.56
0.95	0.0	512	9.58
	1.0	555	9.58
0.98	0.0	522	9.59
	1.0	567	9.60
1.05	0.0	486	9.59
	1.0	510	9.59

SECTION 5

CORRELATION OF THE F-16 / STORE TYPICAL LCO PREDICTIONS WITH FLIGHT TEST DATA

5.1 Flight Test Result and Previous Numerical Prediction

Reference 1 reported that the so called typical limit cycle oscillation (LCO) occurred during the flight test of F-16A Block 15 with the store configuration described in Table 3.1. The instability response was characterized by a gradual onset of sustained limited amplitude wing oscillations where the oscillation amplitude progressively increases with increasing Mach number and dynamic pressure (Ref 1). The measured oscillatory wing tip response during level flight at five altitude is shown in Figure 3.2. Reference 1 described that the dynamic aeroelastic characteristic of the configuration were well behaved. The instability response was anti-symmetric at a frequency of 7.8 Hz for all altitudes.

An attempt to predict this typical LCO case has been conducted by Denegri in Refs 1 and 18. The calculation was performed at M = 0.90. The aerodynamic model used in Refs 1 and 18 is an isolated wing with tip launcher only, *i.e.* the same as the aerodynamic model # 1 of the present work as shown in Fig 5.1. No aerodynamic modeling of fuselage, empenage and underwing stores is included. The only influence of the fuselage, empenage and stores considered in the flutter analysis is their effect on structural modal characteristics. The flutter calculation was conducted using the non-matched method. The critical speed and its frequency are V_f = 312 KCAS and f_f = 8.1 Hz for g = 0%, and V_f = 312 KCAS and f_f = 8.1 Hz for g = 1% (Ref 18). The result indicates that the flutter frequency was correlated well with the flight test data. However, the calculated flutter speed was lower than the flight test data.

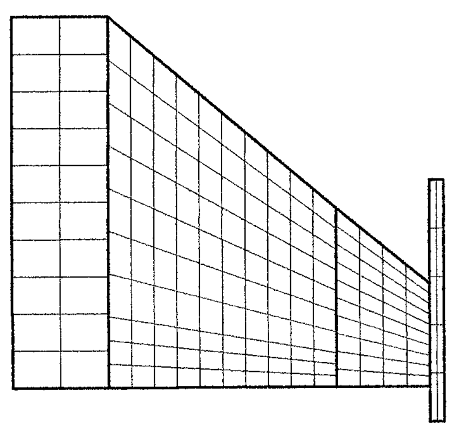


Figure 5.1 Aerodynamic Model # 1 for the typical LCO case

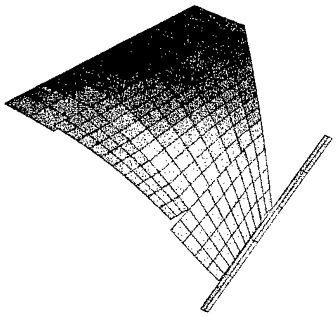
5.2. Linear Aerodynamic Approach

5.2.1 Aerodynamic Model # 1

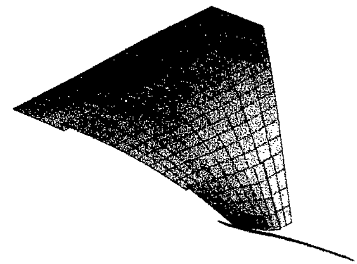
The first aerodynamic model of the present work is the isolated wing with tip launcher (Figure 5.1), *i.e* the same as the model used in Refs 1 and 18. Figure 5.2 shows the first four natural (undamped) mode shapes. Employing a non-matched point flutter analysis of ZAERO at M= 0.90 and sea level density, the critical speed was found to be V_f = 347 KCAS and flutter frequency was f_f = 8.08 Hz for the structural damping g = 0%. For the structural damping g = 1%, the critical speed and frequency are V_f = 531 KCAS and f_f = 8.09 Hz, respectively. These results are very close to the analysis results in Refs 1 and 18 as shown in Table 5.1 and Fig 5.3. Figure 5.4 shows the flutter mode shape for V_f = 531 KCAS at several time steps. The V-g and V-f plots of the present flutter analysis given in Fig 5.4 show similar results to Fig 12 of Ref 17.

Table 5.1 Flutter Results Using Linear Aerodynamics at M = 0.9.

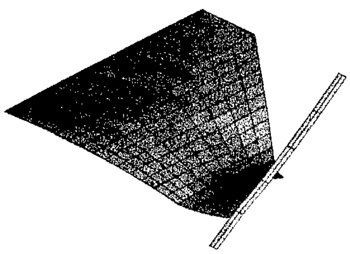
Aerodynamic Model or Methods		Flutter Speed (KCAS)	Flutter Frequency (Hz)
Flight test (on set of flutter speed)		530	7.8
Denegri's DLM results (Aerodynamic Model # 1: Wing + tip launcher only, non matched point)	g = 0%	312	8.10
	g = 1%	494	8.06
Aerodynamic Model # 1: Wing + tip launcher only, (non matched point)	g = 0%	347	8.08
	g = 1%	531	8.09
Aerodynamic Model # 2: Whole aircraft without underwing stores (matched point)	g = 0%	413	8.01
	g = 1%	492	8.00
Aerodynamic Model # 3: Whole aircraft with stores (matched point)	g = 0%	482	7.96
	g = 1%	593	7.91
Aerodynamic Model # 3: Whole aircraft with stores but without rigid body modes (matched point)	g = 0%	483	7.96
	g = 1%	601	7.91



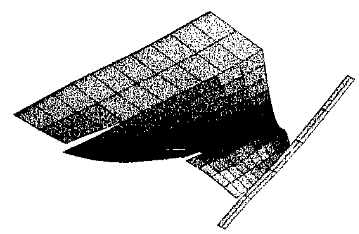
Mode 1 (7.89 Hz)



Mode 2 (8.15)

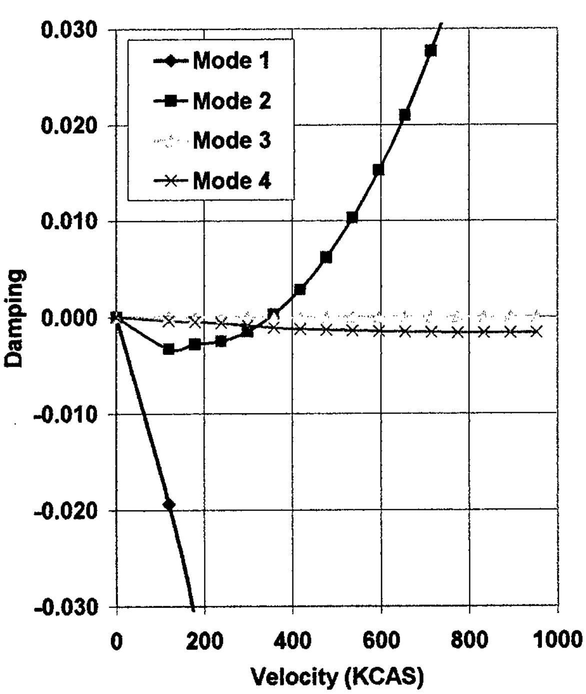


Mode 3 (10.06)



Mode 4 (10.31)

Figure 5.2 Vibration Modes of Aerodynamic Model # 2.



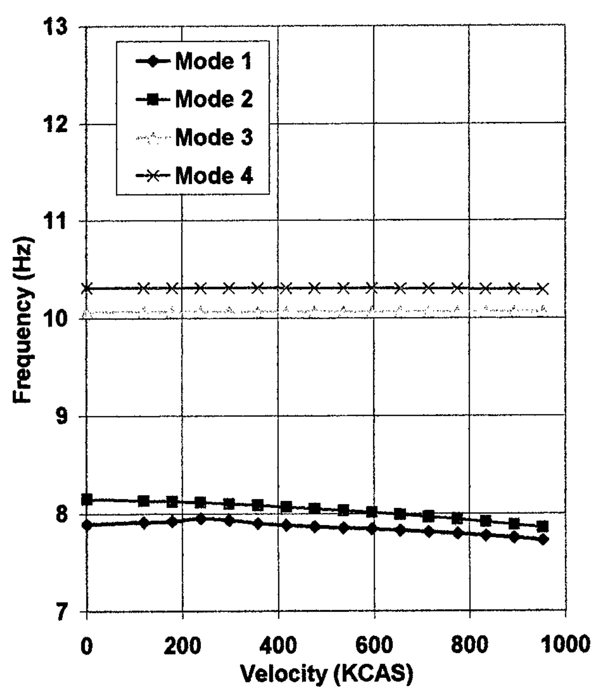


Figure 5.3 The Flutter V-G and V-F Plots for Wing-Tip Launcher Only Model at M = 0.9 Using The Linear Aerodynamic Approach.

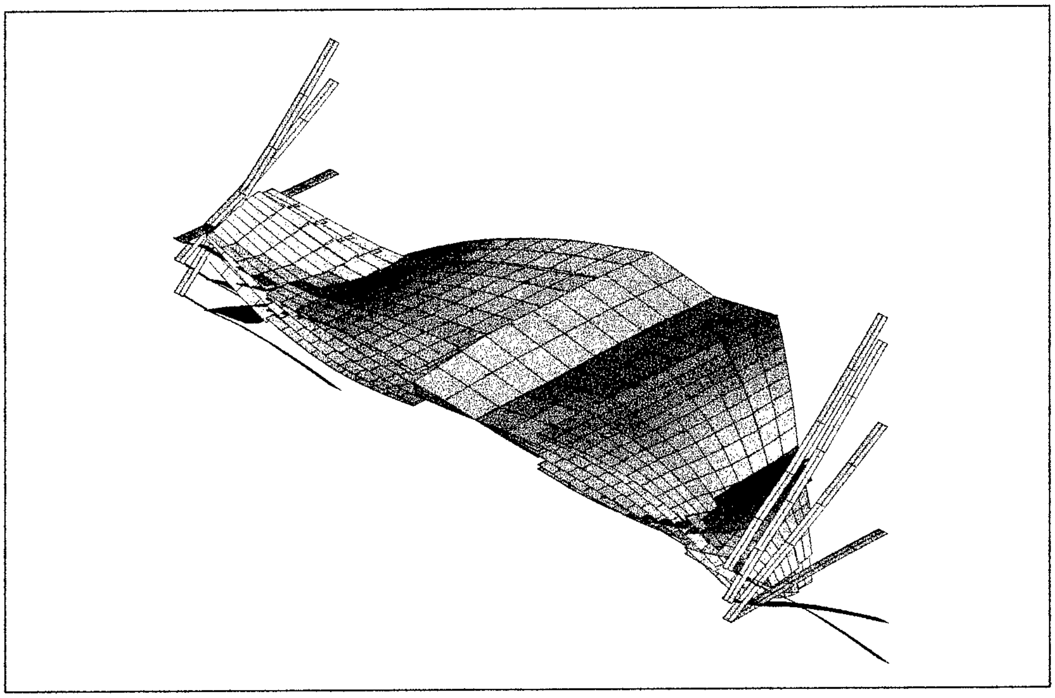


Figure 5.4 The Flutter Mode Shape of The Wingtip Launcher Only Model.

5.2.2. Aerodynamic Model # 2

The flutter calculation was repeated using the aerodynamic model # 2, i.e. the whole aircraft without underwing stores. The flutter calculation using the matched point method gave the flutter speed/frequency at $V_f = 413$ KCAS / $f_f = 8.09$ Hz for $g = 0\%$, and $V_f = 492$ KCAS / $f_f = 8.0$ Hz for $g = 1\%$. The result for this configuration shows that the inclusion of the fuselage and empenage aerodynamic model improves the result, i.e. closer to the flight test data.

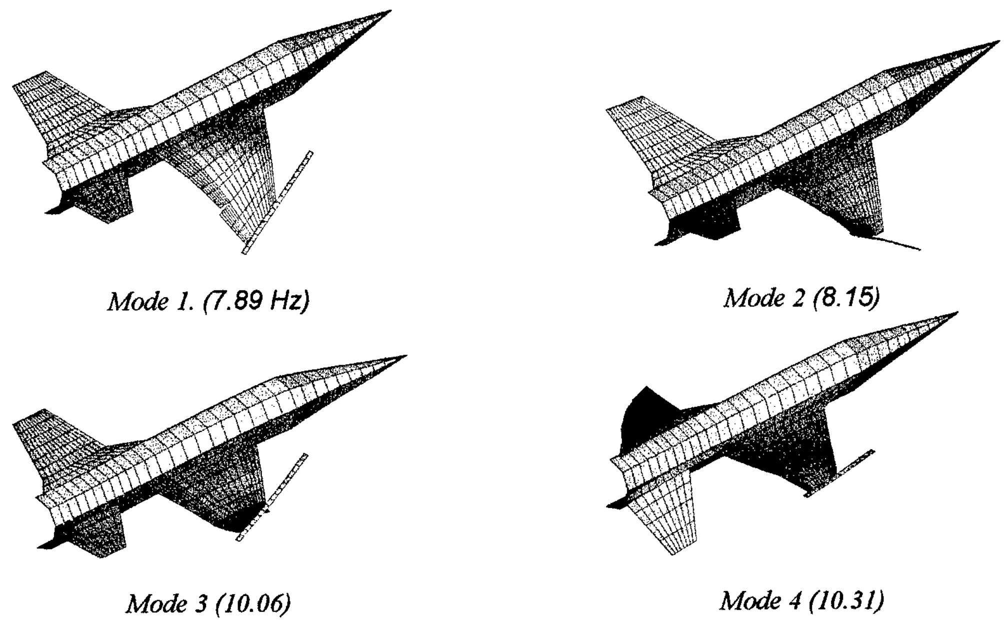
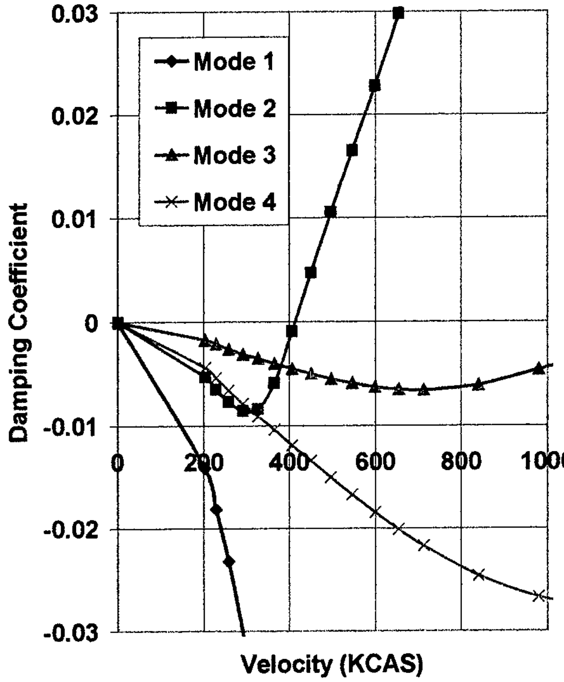


Figure 5.5 Vibration Modes of the Aircraft Model without Underwing Stores.



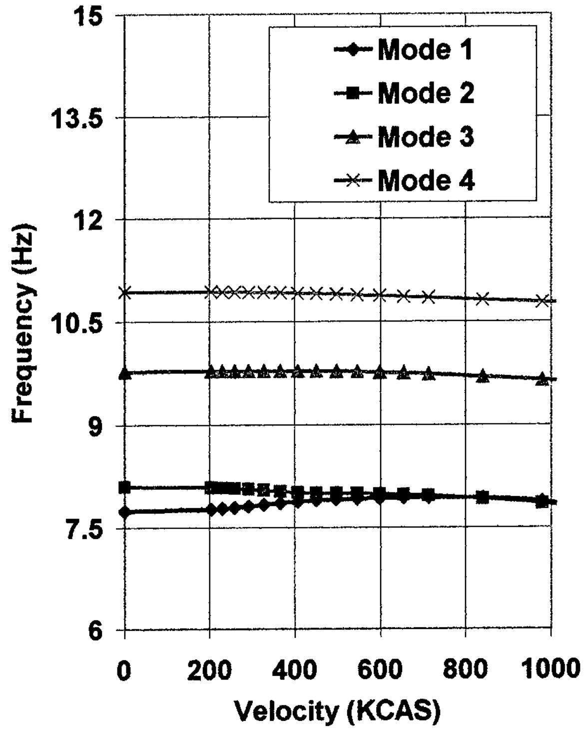


Figure 5.6 The Flutter V-G and V-F Plots for the Whole Aircraft Model without Underwing Stores at M = 0.9 Using the Linear Aerodynamic Approach.

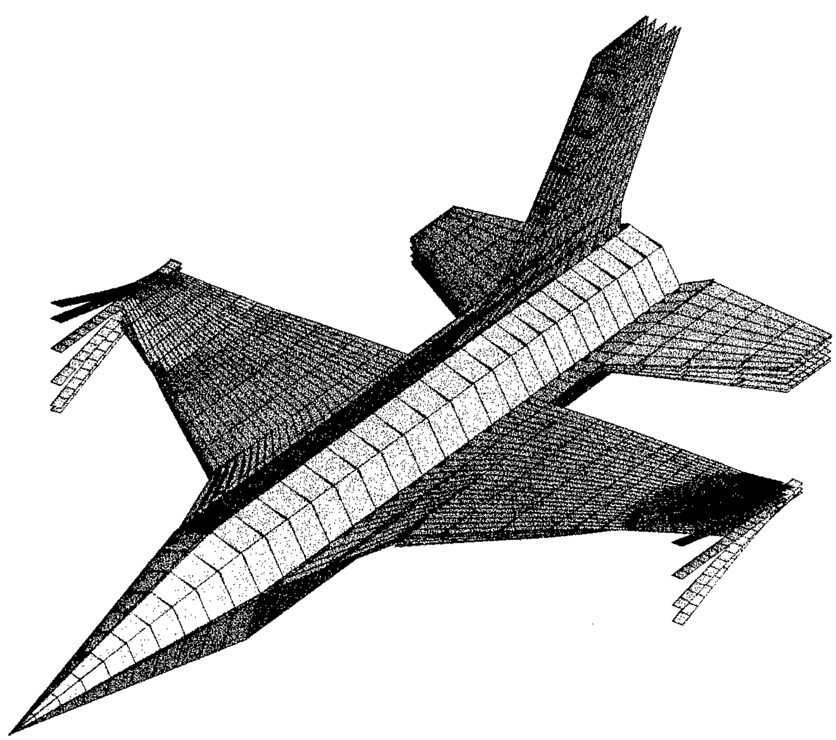


Figure 5.7 The Flutter Mode Shape of the Aircraft Model without Underwing Stores.

5.2.3. Aerodynamic Model # 3 at M = 0.90

The flutter calculation was repeated using the aerodynamic model # 3, i.e. the whole aircraft with underwing stores. The natural mode shapes are shown in Figure 5.8. The flutter calculation using the matched point method gave the flutter speed/frequency at V_f = 483 KCAS / ff = 7.96 Hz. If the structural damping is assumed to be g = 1.0% than the flutter speed and frequency becomes V_f = 601 KCAS and ff = 7.91 Hz.

All of the previous calculations on the typical LCO case did not include the structural rigid body modes. If the anti-symmetric rigid body modes are included to the whole aircraft with store model, the similar procedures gave the flutter speed / frequency at V_f = 482 KCAS / ff = 7.96 Hz for g=0%, and V_f = 593 KCAS / ff = 7.91 Hz for g = 1.0%. These results are very close to the results of the model without rigid body modes. Therefore, for the typical LCO of the present case, the influence of the rigid body modes is not significant. Figure 5.9 shows the flutter v-g and V-f diagram for the aerodynamic model # 3. The flutter modes for several time steps is presented in Fig 5.10.

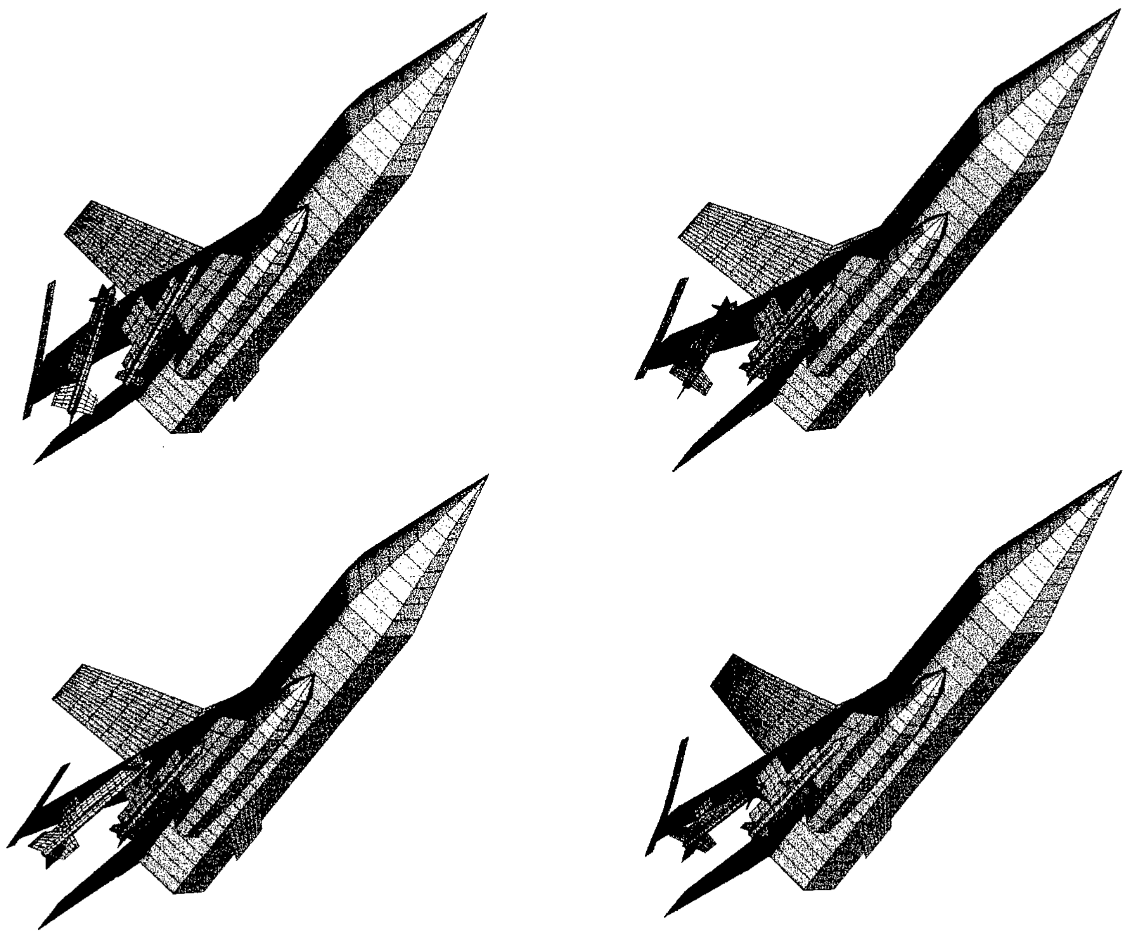


Figure 5.8 Vibration Modes of the Aircraft Model with Underwing Stores

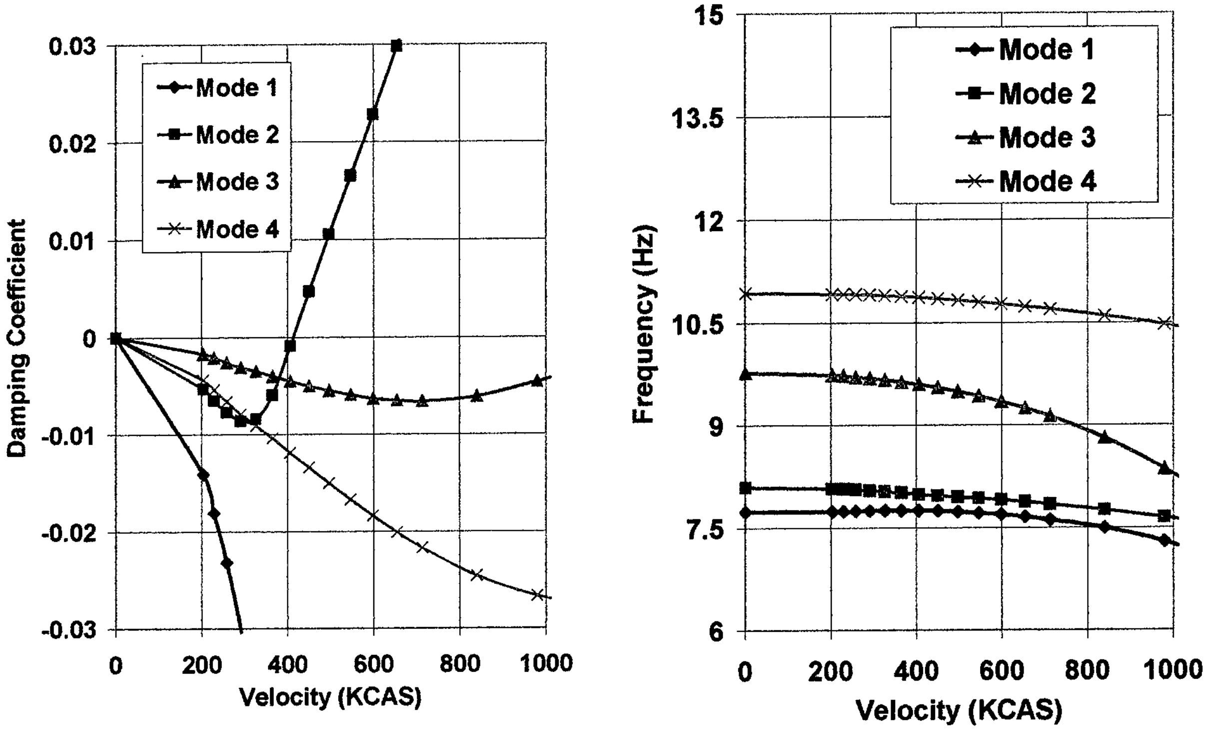


Figure 5.9 The Flutter V-g and V-f plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using the Linear Aerodynamic Approach.

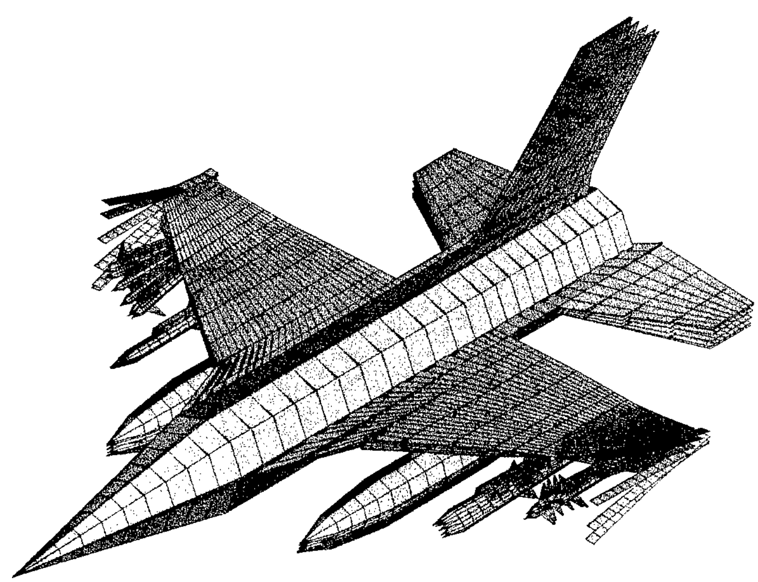


Figure 5.10 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores At M = 0.9.

5.2.5. Aerodynamic Model # 3 at Mach 0.8 – 1.05

The flutter calculations for M = 0.90 showed improvement on the solution results if a more refined aerodynamic model is used. However, previous results does not give a direct correlation between the flutter prediction and the flight test data. Note that, to indicate the flutter onset, the flight test data presents the measure acceleration response level in terms of Mach numbers and altitudes. Therefore, in order to correlate the numerical predictions with the flight test data, the calculation was repeated for several Mach numbers, including M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient as a function of Mach number for each altitude. The critical speed and frequency for each Mach number are given in Table 5.2. Note that the correlation of the flutter prediction with the altitude is automatically generated by using the matched point option of the g-method.

The results presented in Fig 5.11. indicates that :

- at sea level, the linear aerodynamic approach gives a lower mach number than onset mach number of the flight test LCO data.
- at higher altitudes, the linear aerodynamic approach gives a higher mach number than the flight test data.

Table 5.2 Critical Speed and Frequency Using the Linear Aerodynamic Approach (ZONA6/ZONA7)

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	534	7.95
	1.0	654	7.90
0.90	0.0	482	7.96
	1.0	593	7.91
0.95	0.0	431	7.97
	1.0	541	7.92
0.98	0.0	429	7.96
	1.0	526	7.92
1.05	0.0	450	7.93
	1.0	522	7.89

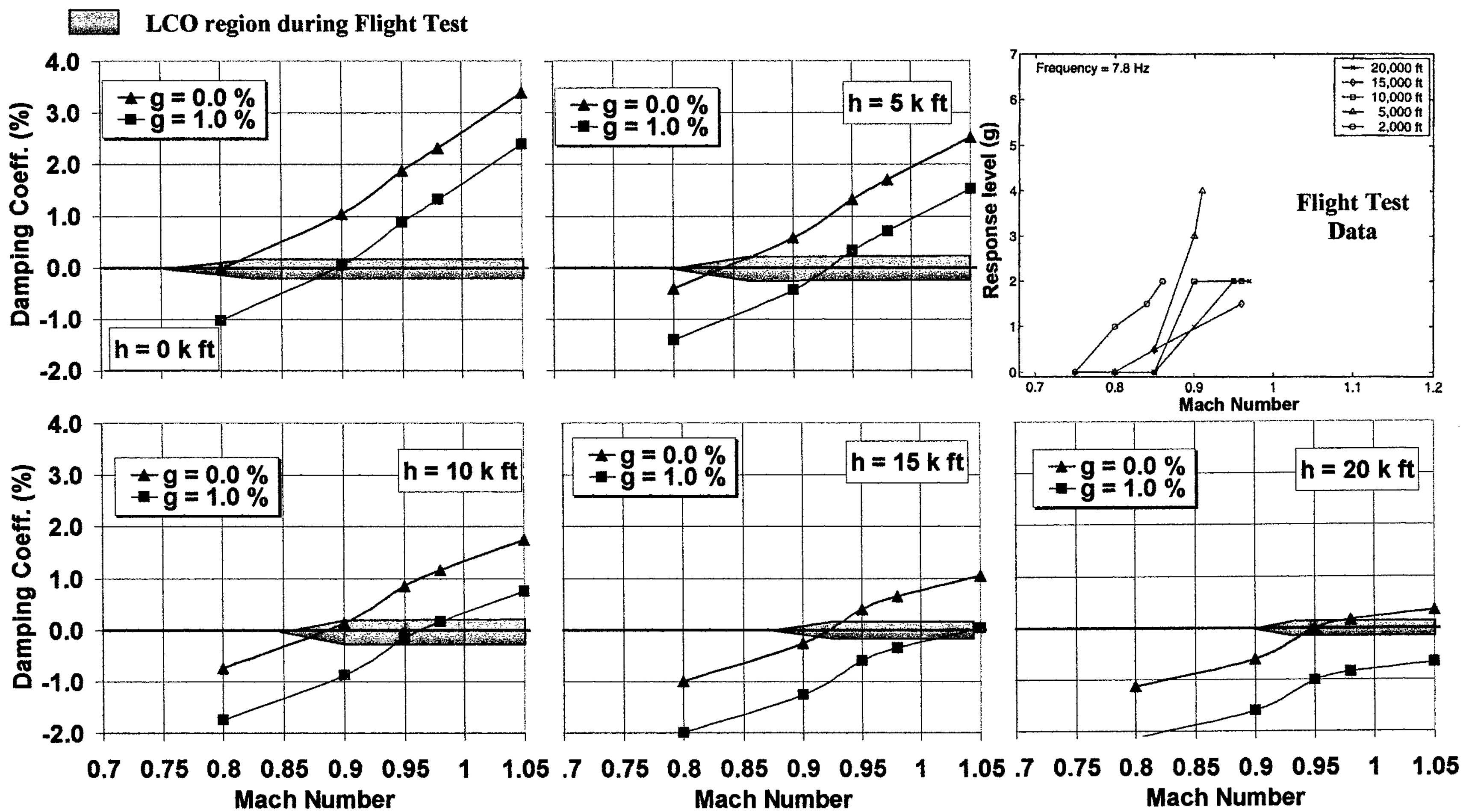


Fig 5.11 Correlation between the Flutter Prediction Using the Linear Aerodynamic Approach (ZONA6/ZONA7) with Flight Test Data.

5.3. Nonlinear Aerodynamic Approach

The flight test for the typical LCO configuration indicated that the aeroelastic instability for this case occurred between 0.75 and 1.1, *i.e.* in transonic regime where the nonlinear behavior of the aerodynamic flow may significantly influence the critical speed. To investigate the flutter calculation in this transonic regime, a nonlinear aerodynamic approach based on the ZTAIC method was used for the prediction of the unsteady aerodynamic data. The steady aerodynamic data was provided by Denegri of Eglin Airforce Base as shown in Section 3. Flutter calculation was conducted to the whole aircraft with stores for Mach numbers ranging between 0.80 and 1.05. The rigid body modes were included in the structural dynamic calculations.

5.3.1 Aerodynamic Model # 3 at M = 0.90

The flutter calculation for M = 0.90 using the matched point method gave the flutter speed/frequency at V_f = 468 KCAS / f_f = 7.97 Hz. Note that there is no second critical speed in this third model. If the structural damping is assumed to be g = 1.0%, the flutter speed and frequency becomes V_f = 588 KCAS and f_f = 7.93 Hz. Compare to the results based on the linear aerodynamic approach given in Table 5.1, the present result using the nonlinear aerodynamic approach is closer to the flight test data. Figure 5.12 shows the V-g and V-f plot for Mach 0.90. The associated flutter mode is presented in Fig 5.13.

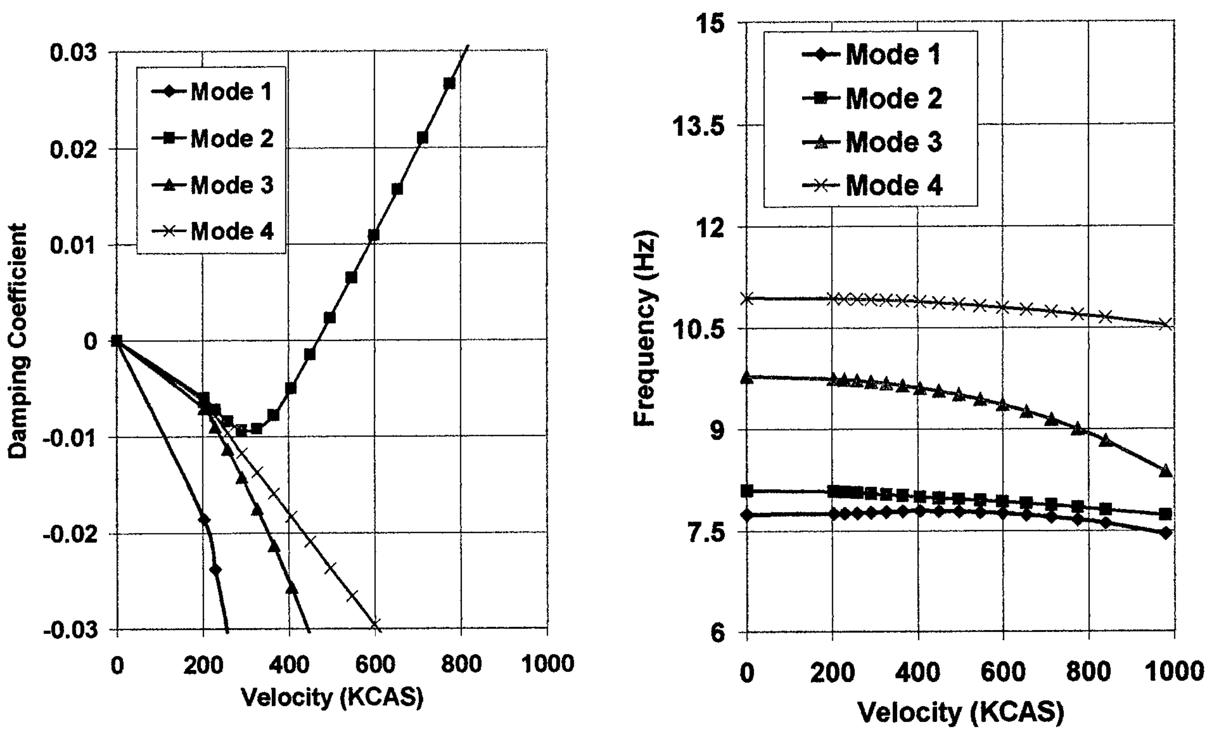


Figure 5.12 The Flutter V-G and V-F Plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using the Nonlinear Aerodynamic Approach.

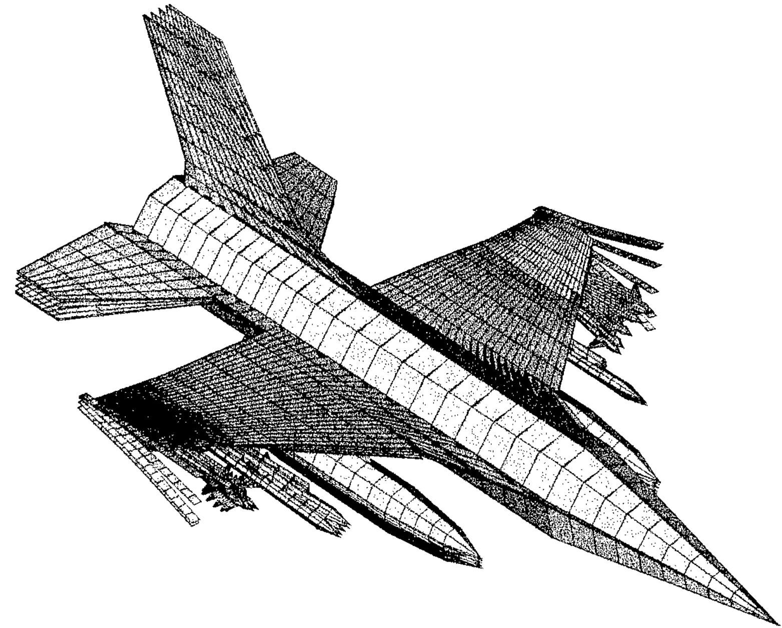


Figure 5.13 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores at M = 0.9 Calculated Using the Non Linear Aerodynamic Method

5.3.2. Aerodynamic Model # 3 at M = 0.80 – 1.05

In order to correlate the numerical predictions with the flight test data, the calculation for the nonlinear aerodynamic approach was repeated for several Mach numbers, namely M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient and Mach number as well as the altitudes. The critical speed and frequency for each Mach number are given in Table 5.3. The results presented in Fig 5.15 shows that:

- ZTAIC predicts non-explosive damping of the unstable modes for all altitudes.
- In the post-flutter region, it is very likely that the nonlinearity-induced stable damping (from either the structures or aerodynamics, if any) can nullify the unstable damping and stop the growth of the amplitude, leading to LCO.
- Similar to the classical flutter case, the on-set of LCO is very sensitive to the linear structural damping level.

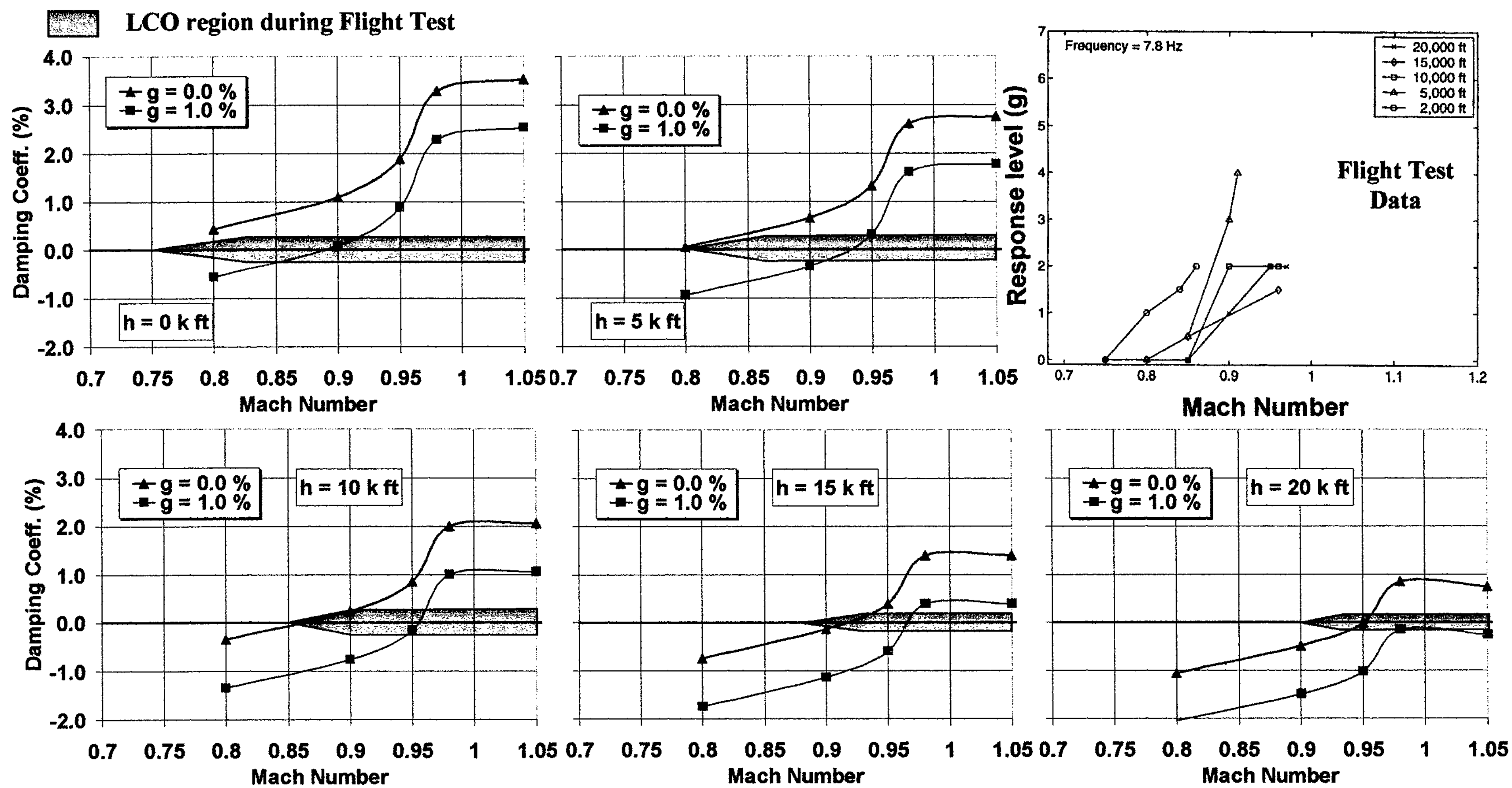


Figure 5.14 The Correlation between the Flutter Prediction using the Nonlinear Aerodynamic Approach (ZTAIC) and the Flight Test Data.

Table 5.3 Critical speed and Frequency Using the Nonlinear Aerodynamic Approach (ZTAIC).

Mach Number	***Damping Coeff. g (%)***	***Flutter Speed (KCAS)***	***Flutter Frequency (Hz)***
0.80	0.0	480	7.97
	1.0	606	7.95
0.90	0.0	468	7.97
	1.0	588	7.93
0.95	0.0	409	7.99
	1.0	525	7.95
0.98	0.0	372	8.00
	1.0	455	7.98
1.05	0.0	422	7.94
	1.0	494	7.92

SECTION 6

CORRELATION OF THE F-16 / STORE NON-TYPICAL LCO PREDICTIONS WITH FLIGHT TEST DATA

6.1 Flight Test Result and Previous Numerical Prediction

Reference 1 described that a non-typical LCO response occurred during the flight test of F-16 with the store configurations shown in Table 3.1. The instability response was characterized by a gradual onset of sustained limited amplitude wing oscillations where the oscillation amplitude does not progressively increase with increasing Mach number (Ref 1). The oscillation may be present only in a limited portion of the flight envelope. The measured oscillatory wing tip response during level flight at five altitude is shown in Figure 3.3. The response behavior of this configuration was only sensitive in 0.88 – 0.94 Mach range. The instability response was antisymmetric at a frequency of 8.2 Hz for all altitudes.

An attempt to predict this non-typical LCO case has been conducted by Denegri in Refs 1 and 18. The calculation was performed at M = 0.90. The aerodynamic model used in Refs 1 and 18 is an isolated wing with tip launcher only, *i.e.* the same as the aerodynamic model # 1 of the present work as shown in Fig 6.1. No aerodynamic modeling of fuselage, empenage and underwing stores is included. The only influence of the fuselage, empenage and stores considered in the flutter analysis is their effect on structural modal characteristics. The flutter calculation was conducted using the non-matched point method. The critical speed and frequency are V_f = 393 KCAS and f_f = 8.26 Hz for the structural damping g = 0%. The result indicates that the flight test frequency is well correlated with the critical mode frequency. However, the calculated critical speed was higher than the flight test data as shown in Table 4.1

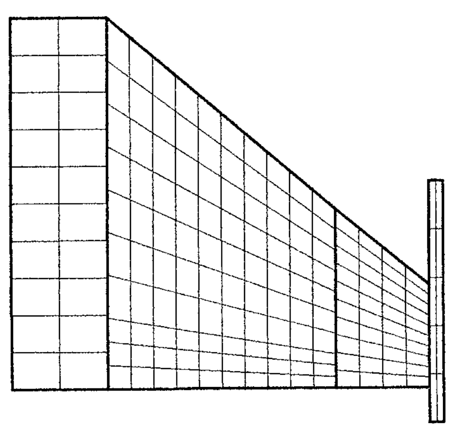


Figure 6.1 Aerodynamic Model # 1 for the Nontypical LCO case

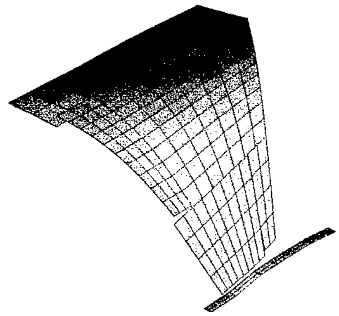
6.2 Linear Aerodynamic Approach

6.2.1 Aerodynamic Model # 1

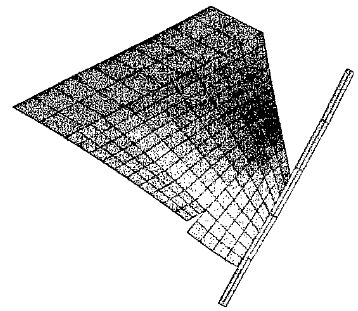
The first aerodynamic model of the present work is the isolated wing with tip launcher (Figure 6.1), *i.e* the same as the model used in Ref 17. Figures 6.2 show the first four natural (undamped) mode shapes. Employing a non-matched point flutter analysis of ZAERO at M= 0.90 and sea level density, the critical speed was found to be V_f = 403 KCAS and flutter frequency was f_f = 8.24 Hz for the structural damping g = 0%. For the structural damping g = 1%, the critical speed and frequency are V_f = 602 KCAS and f_f = 8.21 respectively. These results are very close to the analysis results in Refs 1 and 18 as shown in Table 6.1 and Fig 6.3. Figure 6.4 shows the flutter mode shape at several time steps. The V-g and V-f plots of the present flutter analysis given in Fig 6.4 show similar results to Fig 12 of Ref 17.

Table 6.1 Flutter Results Using Linear Aerodynamics at M = 0.9.

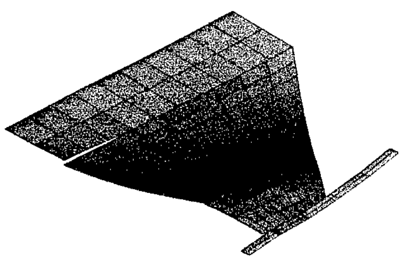
Aerodynamic Model or Methods		Flutter Speed (KCAS)	Flutter Frequency (Hz)
Flight test (on set of flutter speed)		560	8.2
Denegri's DLM results (Aerodynamic Model # 1: Wing + tip launcher only, non matched point, g = 0%)		393	8.26
Aerodynamic Model # 1: Wing + tip launcher only, (non matched point)	g = 0%	403	8.24
	g = 1%	602	8.21
Aerodynamic Model # 2: Whole aircraft without underwing stores (matched point)	g = 0%	508	8.22
	g = 1%	678	8.18
Aerodynamic Model # 3: Whole aircraft with stores (matched point)	g = 0%	471	8.18
	g = 1%	690	8.08
Aerodynamic Model # 3: Whole aircraft with stores but without rigid body modes (matched point)	g = 0%	642	8.13
	g = 1%	796	8.03



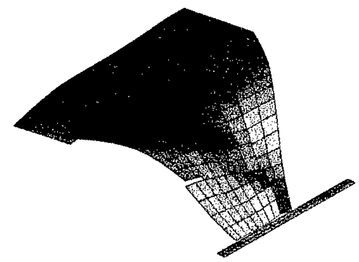
Mode 1 (8.28 Hz)



Mode 2 (8.31 Hz)

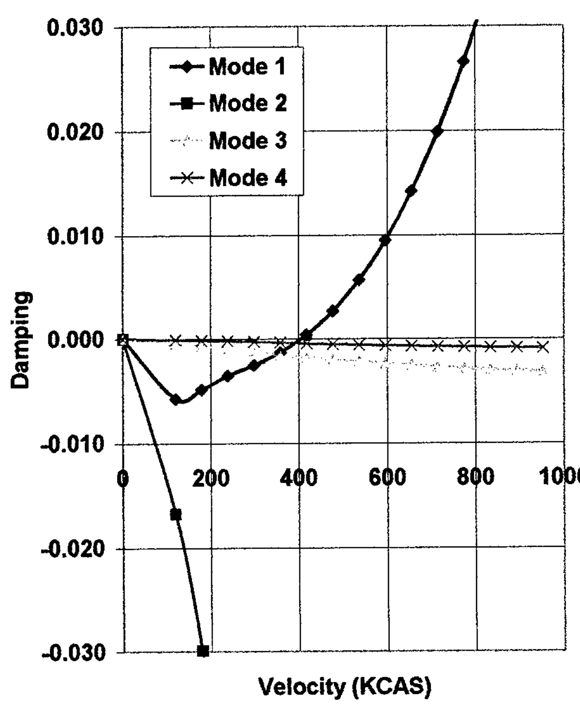


Mode 3 (10.32 Hz)



Mode 4 (12.06 Hz)

Figure 6.2 Vibration Modes of Aerodynamic Model # 1.



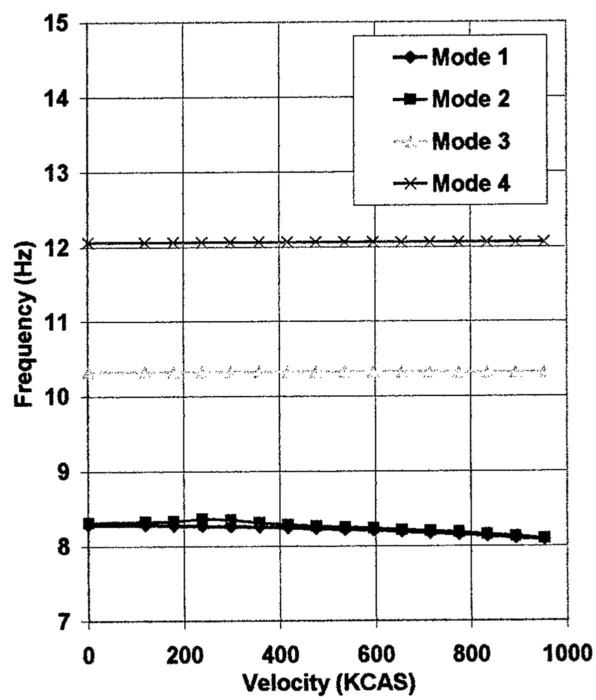


Figure 6.3 The Flutter V-g and V-f plots for Wing-tip Launcher Only Model at M = 0.9 Using the Linear Aerodynamic Approach.

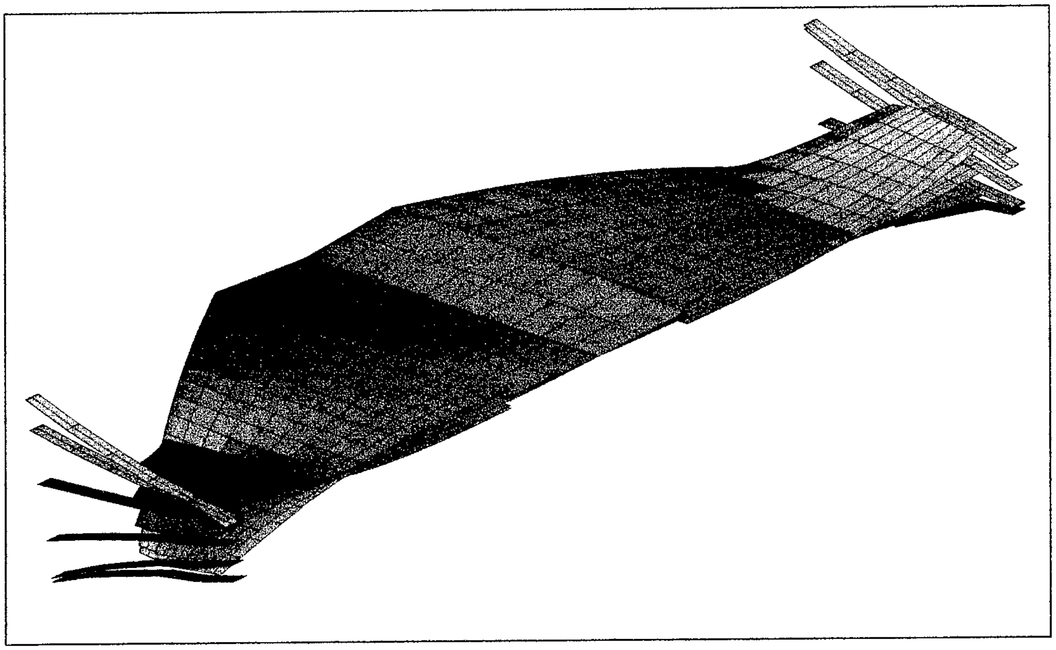
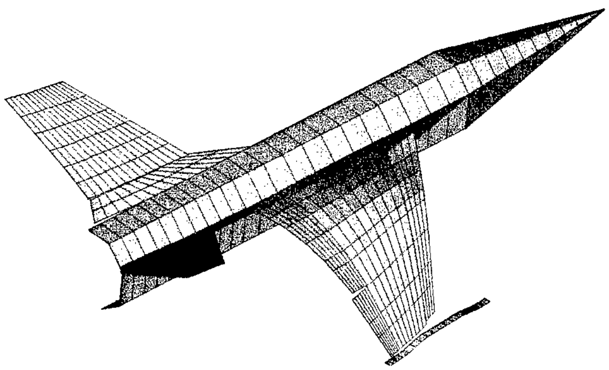


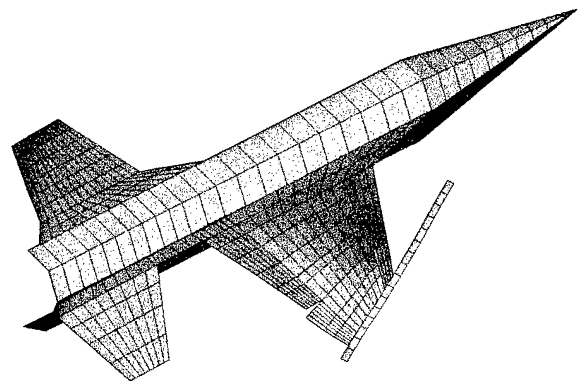
Figure 6.4 The Flutter Mode Shape of the Wing-Tip Launcher Only Model.

6.2.2 Aerodynamic Model # 2

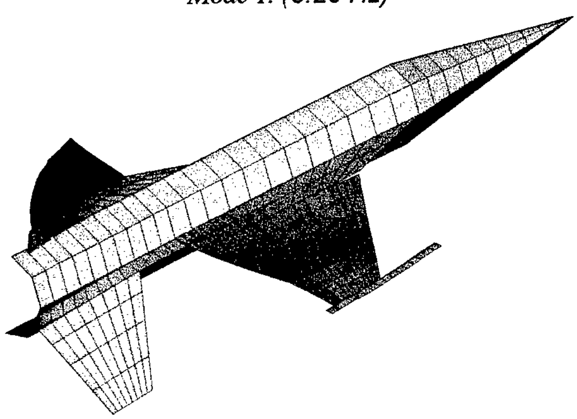
The flutter calculation was repeated using the aerodynamic model # 2, i.e. the whole aircraft without underwing stores. The flutter calculation using the matched point method gave the flutter speed/frequency at $V_f = 508$ KCAS / $f_f = 8.22$ Hz. If the structural damping is assumed to be g = 1.0%, than the flutter speed and frequency becomes $V_f = 678$ KCAS and $f_f = 8.18$ Hz. The result for this configuration shows that the inclusion of the fuselage and empenage aerodynamic model improves the result, i.e. closer to the flight test data.



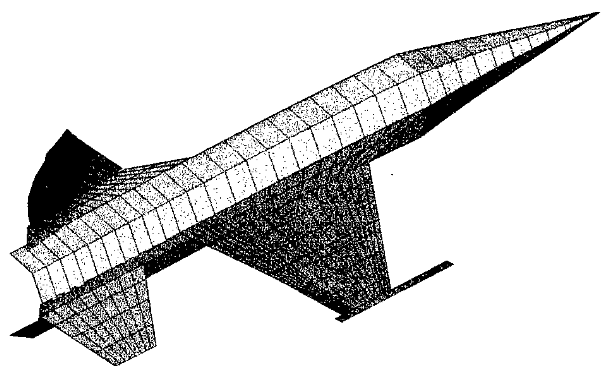
Mode 1. (8.28 Hz)



Mode 2 (8.31)



Mode 3 (10.32)



Mode 4 (12.06)

Figure 6.5 Vibration Modes of the Aircraft Model without Underwing Stores.

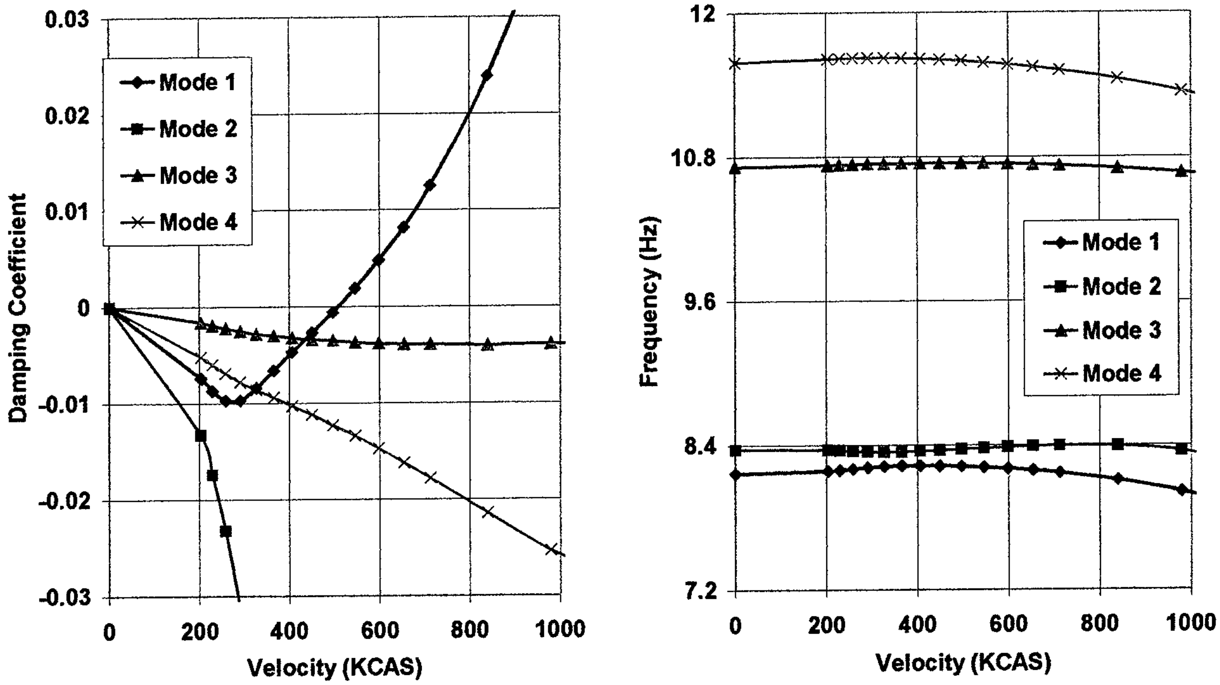


Figure 6.6 The Flutter V-g and V-f Plots for the Whole Aircraft Model without Underwing Stores at M = 0.9 Using The Linear Aerodynamic Approach.

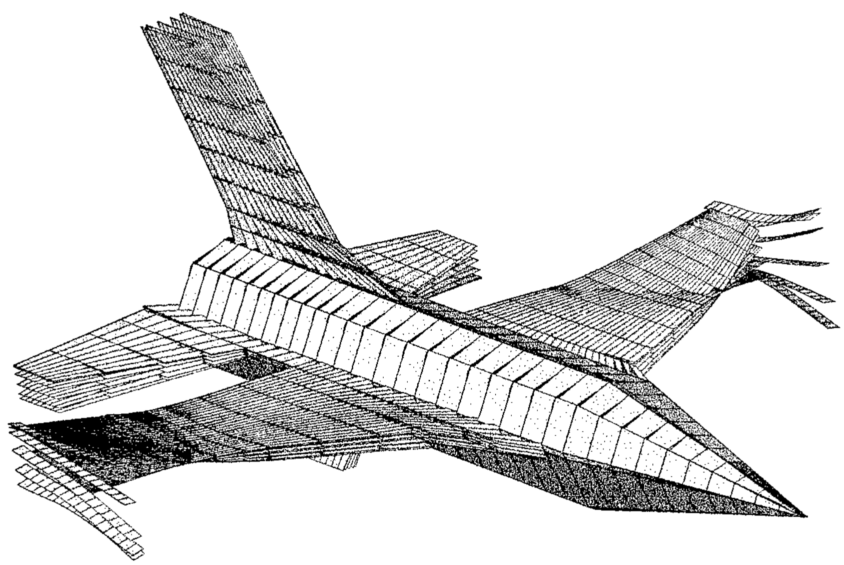


Figure 6.7 The Flutter Mode Shape of the Aircraft Model without Underwing Stores

6.2.3 Aerodynamic Model # 3 at M = 0.90

The flutter calculation was repeated using the aerodynamic model # 3, i.e. the whole aircraft with underwing stores. The natural mode shapes are shown in Figure 6.8. The flutter calculation

using the matched point method gave the flutter speed/frequency at V_f = 642 KCAS / f_f = 8.13 Hz. Note that there is no second critical speed in this third model. If the structural damping is assumed to be g = 1.0% than the flutter speed and frequency becomes V_f = 796 KCAS and f_f = 8.03 Hz. Clearly, the result for this configuration is closer to the flight test data as shown in Table 6.1.

All of the previous calculations on the non-typical LCO did not include the structural rigid body modes. If the anti-symmetric rigid body modes are included to the whole aircraft with store model, the similar procedures gave the flutter speed / frequency at V_f = 471 KCAS / f_f = 8.18 Hz for g=0%, and V_f = 690 KCAS / f_f = 8.08 Hz for g = 1.0%. These results are very close to the results of the model without rigid body modes. Therefore, for the classical flutter of the present case, the influence of the rigid body modes is not significant. Figure 6.9 shows the flutter V-g and V-f diagram for the aerodynamic model # 3. The flutter modes for several time steps is presented in Fig 6.10.

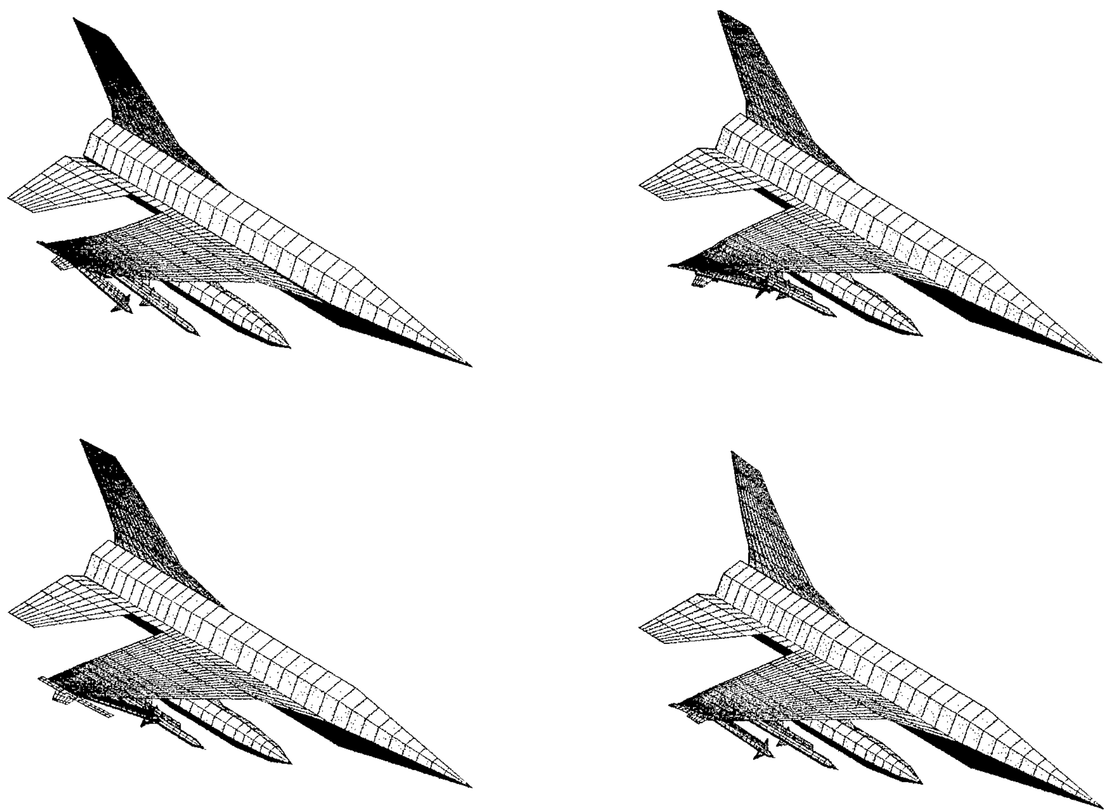


Figure 6.8 Vibration Modes of the Aircraft Model with Underwing Stores.

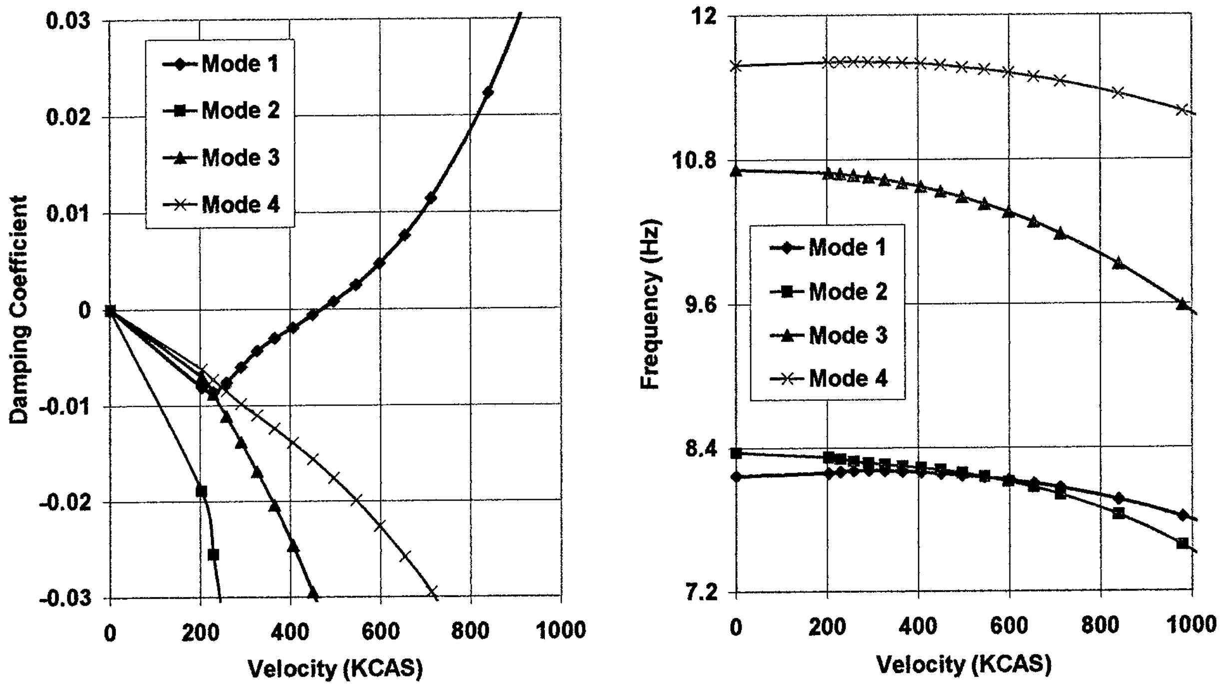


Figure 6.9 The Flutter V-g and V-f plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using the Linear Aerodynamic Approach.

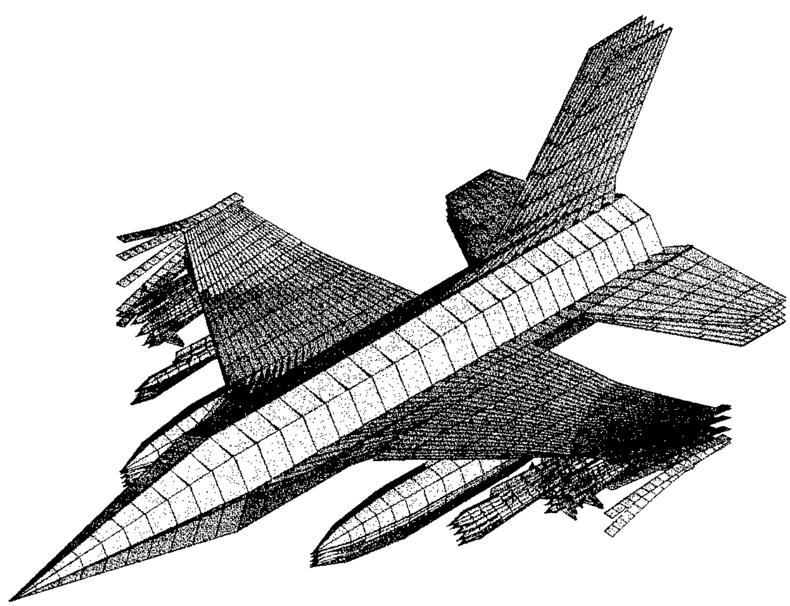


Figure 6.10 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores at M = 0.9.

6.2.4 Aerodynamic Model # 3 at Mach 0.8 – 1.05

The flutter calculations for M = 0.90 showed improvement on the solution results if a more refined aerodynamic model is used. However, previous results does not give a direct correlation between the flutter prediction and the flight test data. Note that, to indicate the flutter onset, the flight test data presents the measure acceleration response level in terms of Mach numbers and altitudes. Therefore, in order to correlate the numerical predictions with the flight test data, the calculation was repeated for several Mach numbers, namely M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient as a function of Mach number for each altitude. The critical speed and frequency for each Mach number are given in Table 6.2. The results presented in Fig 6.11. shows that

- Linear aerodynamic approach (ZONA6/ZONA7) predicts non-explosive damping of the unstable mode in all altitudes.
- For the altitude lower than 15,000 ft, the flutter onset Mach number of the flight test data was correlated very well with the linear aerodynamic approach if the structural damping is assumed to be 1%.
- For the altitude of 15,000 ft and higher, the onset Mach number of the flight test data was occurred near M = 0.98 and 1.02 where the nonlinearity effect of the transonic aerodynamic is significant. Therefore, the linear aerodynamic approach gives a higher prediction of the onset Mach number for these altitudes.

Table 6.2 Critical Speed and Frequency Using ZONA6/ZONA7 (Linear Aerodynamic Approach).

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	576	8.15
	1.0	778	8.03
0.90	0.0	571	8.17
	1.0	615	8.08
0.95	0.0	451	8.17
	1.0	656	8.08
0.98	0.0	474	8.17
	1.0	660	8.08
1.05	0.0	376	8.20
	1.0	573	8.11

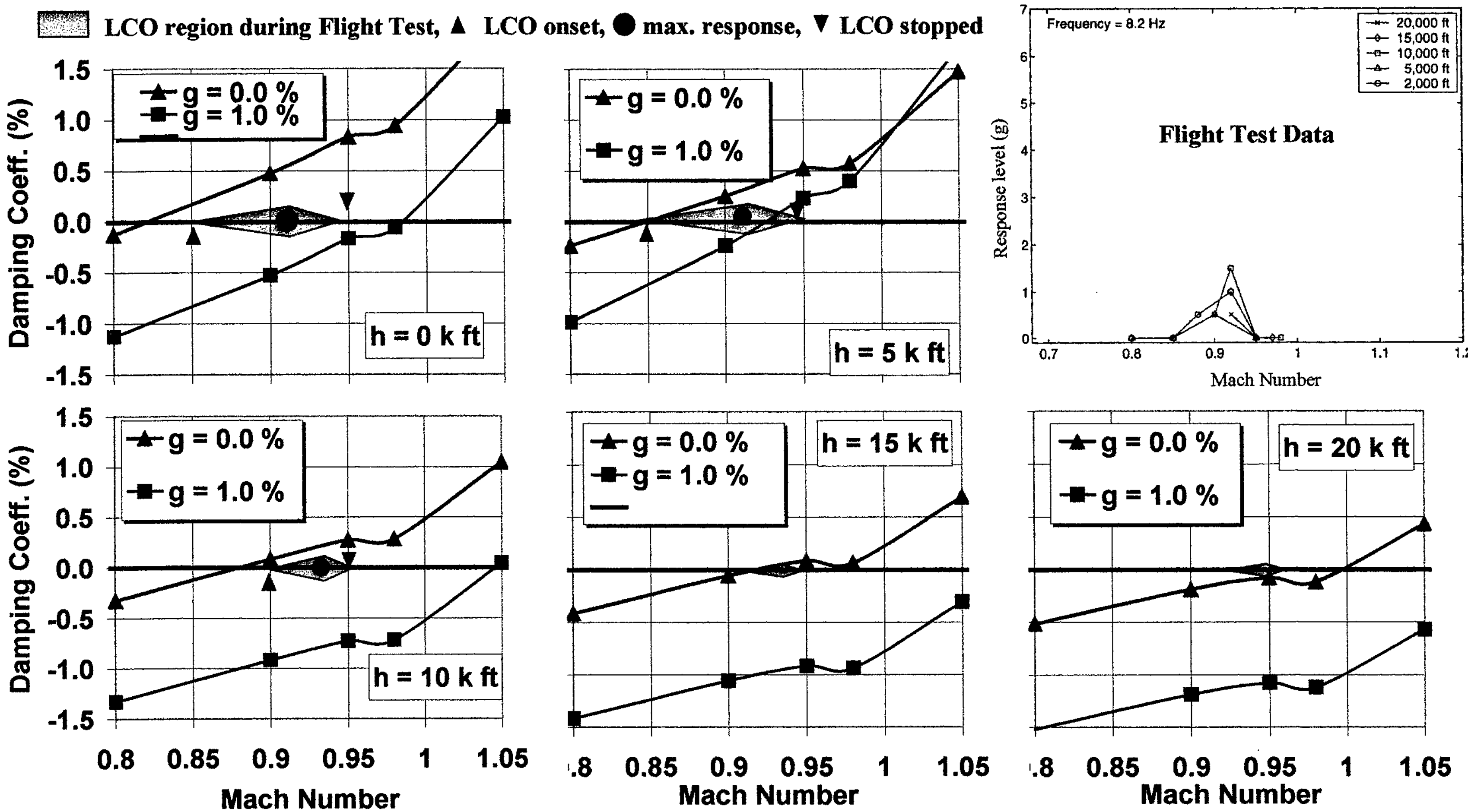


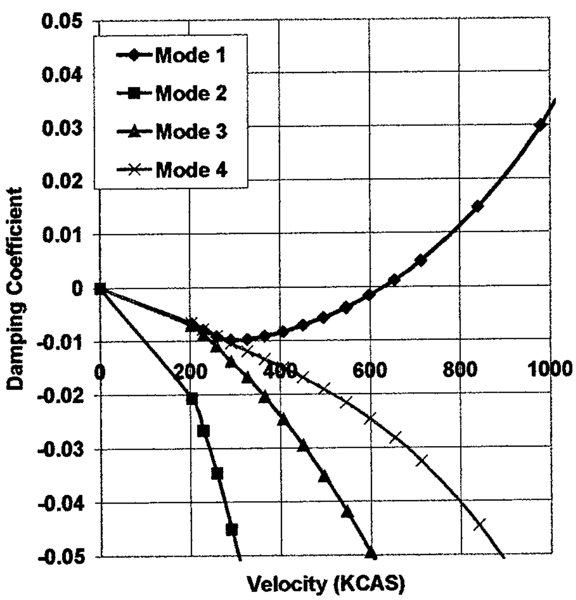
Figure 6.11 Correlation between the Flutter Prediction using the Linear Aerodynamic Approach (ZONA6/ZONA7) with Flight Test Data of the Classical Flutter Case.

6.3 Nonlinear Aerodynamic Approach

The flight test for the non-typical LCO configuration indicated that the aeroelastic instability for this case occurred between 0.85 and 1.1, *i.e.* in transonic regime where the nonlinear behavior of the aerodynamic flow may significantly influence the critical speed. To investigate the flutter calculation in this transonic regime, a nonlinear aerodynamic approach based on the ZTAIC method was used for the prediction of the unsteady aerodynamic data. The steady aerodynamic data was provided by Ref 20 as shown in section 3. Flutter calculation was conducted to the whole aircraft with stores for Mach numbers ranging between 0.80 and 1.05. The rigid body modes were included in the structural dynamic calculations.

6.3.1 Aerodynamic Model # 3 at M = 0.90

The flutter calculation for M = 0.90 using the matched point method gave the flutter speed/frequency at V_f = 630 KCAS / f_f = 8.16 Hz. If the structural damping is assumed to be g = 1.0%, the flutter speed and frequency becomes V_f = 595 KCAS and f_f = 8.18 Hz. Compared to the results based on the linear aerodynamic approach given in Table 6.1, the present result using the nonlinear aerodynamic approach is closer to the flight test data. Figure 6.12 shows the V-g and V-f plot for Mach 0.90. The associated flutter mode is presented in Fig 6.13.



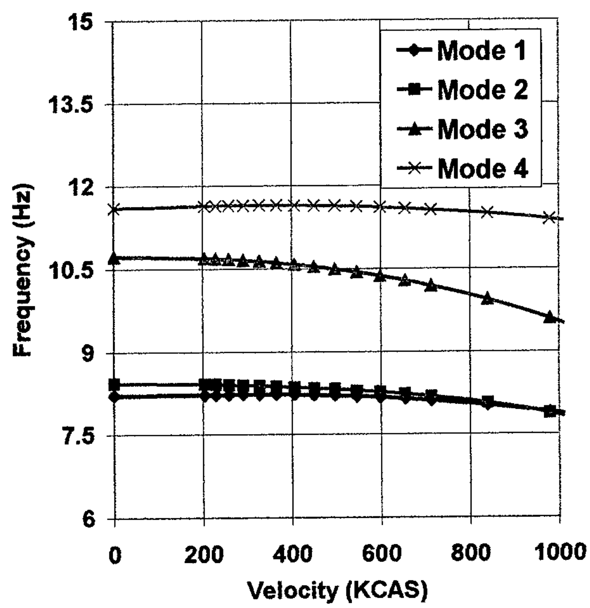


Figure 6.12 The Flutter V-g and V-f Plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using the Nonlinear Aerodynamic Approach.

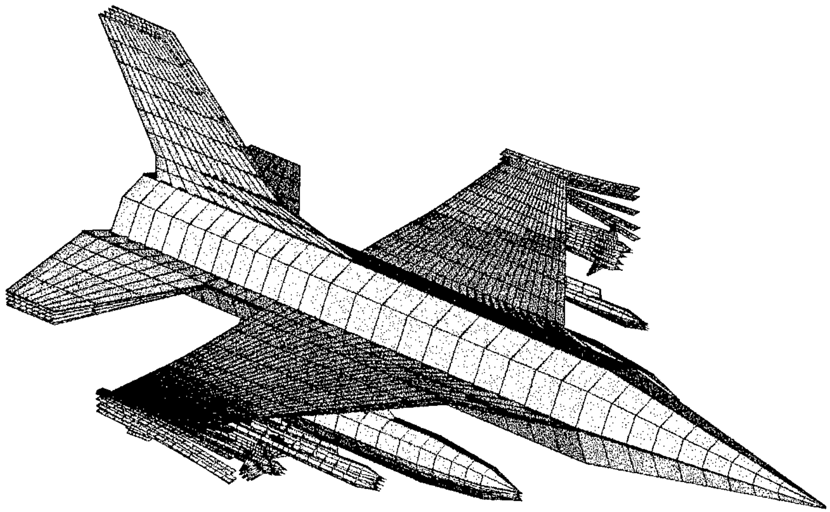


Figure 6.13 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores at M = 0.9 Calculated Using the Non Linear Aerodynamic Method.

6.3.2 Aerodynamic Model # 3 at M = 0.80 – 1.05

In order to correlate the numerical predictions with the flight test data, the calculation for the nonlinear aerodynamic approach was repeated for several Mach numbers, namely M = 0.80, 0.90, 0.95, 0.98, and 1.05. The rigid body modes were included in the calculations. Figure 6.14 shows the flutter solution represented by the damping coefficient as a function of Mach number for several altitudes. Table 6.3 shows the critical speed and frequency for each Mach number. The results presented in Fig 6.14. indicate that:

- ZTAIC, i.e. the nonlinear aerodynamic approach, predicts the hump flutter modes in all altitudes, i.e. the aeroelastic system is unstable before M = 0.95, but becomes stable between M=0.95 and M=1.0.
- Similar to the classical flutter and the typical LCO cases, the on-set of LCO is very sensitive to the linear structural damping level. But, because of the sudden increase of the stable damping at M=0.98, the condition where LCO disappears is relatively insensitive to the structural damping.
- The above shows that indeed ZTAIC can provide correct trend for predicting the non-typical LCO case.

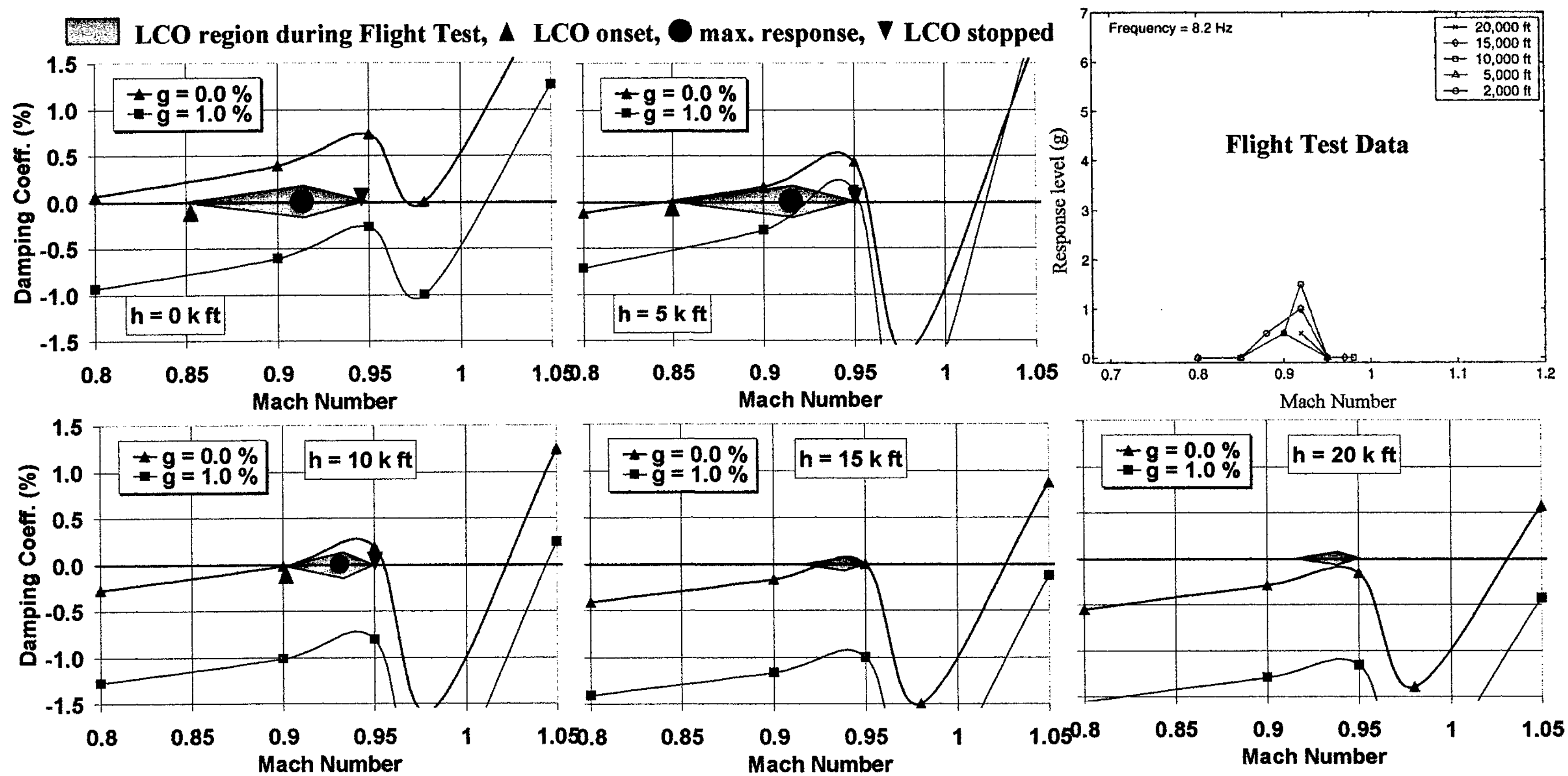


Figure 6.14 The Correlation between the Flutter Prediction using the Nonlinear Aerodynamic Approach (ZTAIC) and the Flight Test Data.

Table 6.3 Critical speed and Frequency Using ZTAIC (Nonlinear Aerodynamic Approach).

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	616	8.19
	1.0	752	8.12
0.90	0.0	630	8.16
	1.0	595	8.18
0.95	0.0	475	8.18
	1.0	672	8.09
0.98	0.0	1127	8.00
	1.0	1195	8.00
1.05	0.0	365	8.21
	1.0	543	8.16

SECTION 7

CONCLUSIONS AND FUTURE WORK

We have successfully investigated the accuracy of the ZAERO aeroelastic software system to predict various types of flutter and limit cycle oscillations (LCO) and developed a massive store management (MSM) system as a platform for a rapid assessment of flutter/LCO (RAFEL) software system for massive aircraft/store configurations.

To test the capability of ZAERO, a number of aircraft/store configurations with various structure and aerodynamic modeling are used in subsonic, transonic and supersonic flight regimes using linear and nonlinear unsteady aerodynamic procedures of ZAERO. Three different F-16 with store configurations were used to identify various categories of aeroelastic instability responses including classical flutter, typical LCO and non-typical LCO. According to Reference 1, these categories are representative of the wide variety of aeroelastic responses encountered by fighter aircraft with external stores.

To accurately predict the flutter/LCO onset speed and frequency at various flight altitudes, the matched point option of the g-method, a robust aeroelastic solver of ZAERO, was used. The procedure is important to correlate directly the flutter/LCO prediction in terms of flight altitude and Mach number with the flight test data.

The influence of structural rigid body modes on aeroelastic instability was investigated. The result shows that the influence is small for classical flutter and typical LCO cases, but can be significant for the non-typical LCO case. The inclusion of the structural rigid body modes in the aeroelastic analysis adds very small fraction of computational time but increase the accuracy of the result. Therefore, it is recommended to include the rigid body modes in the flutter/LCO prediction.

The influence of linear and nonlinear unsteady aerodynamic methods to discern differences between classical flutter, typical LCO and non-typical LCO was investigated. By using ZONA6/ZONA7 of ZAERO for a linear aerodynamic approach, the classical flutter case has been successfully identified. By using ZTAIC of ZAERO for a nonlinear aerodynamic approach, the differences between typical and non-typical LCO cases as well as classical flutter case have been successfully predicted including the oscillation frequency and onset velocity of the instability response.

The influence of various aerodynamic modeling of stores and whole aircraft, including fuselage, wing and horizontal/vertical tails, was investigated. The simplest aerodynamic model, i.e. the wing with tip launcher only, is capable to identify the oscillation frequency of flutter/LCO, but fails to predict the onset velocity. The use of more refined aerodynamic model including the whole aircraft and stores successfully improves the prediction and provides a well correlation with the flight test data. Therefore, the store aerodynamic modeling is important for accurate prediction of the flutter/LCO.

To anticipate the increase of computational time due to the additional aerodynamic model of massive aircraft/store configurations, a rapid aeroelastic computational scheme was designed using ZAERO as the basic software system. The rapid computational scheme is based on the strategy to re-use the aerodynamic influence coefficient (AIC) data, which is the most time consuming part in aeroelastic computation, and based on an efficient massive data management system to rapidly store and recall the AIC data. A scheme to utilize various parts of ZAERO, including ZONA6, ZONA7, ZTAIC, the g-method package and spline modules, has been designed to substantially increase the computational efficiency of ZAERO for the massive aircraft/store flutter/LCO assessment.

The achievement of the Phase I objectives has paved the way and has provided considerable technical insight for future implementation of the RAFEL software system in aircraft/store flutter clearance. Consequently, it leads to a well-conceived plan for a Phase II development. The proposed tasks to be conducted in Phase II include:

Implementation of the proposed RAFEL software system:

- Develop an off-line software to generate invariant AIC matrices of aircraft and stores, set up corresponding finite element models and spline input, and save the data on a permanent data base.
- Develop an online software that is driven by the GUI (Graphical User Interface) pre-processor to generate the input files of ZAERO and NASTRAN by retrieving the permanent database and can launch NASTRAN and ZAERO jobs.
- Develop an online software that is driven by the GUI post-processor to rapidly search for the critical flutter/LCO configurations and display the results.

Implementation of GUI system as the underlying software to

- Graphically display all available stores whose data have been saved in the data base.
- Allow users to graphically select arbitrary store configurations.
- Retrieve store data from the permanent database, assemble NASTRAN and ZAERO input files and launch NASTRAN and ZAERO input files.
- Process the ZAERO results of all aircraft/store configurations to search for the critical flutter/LCO cases and graphically display the results.

Implementation of parallel computing environment to accelerate computation

- A parallel virtual machine (PVM) software system can establish a network system linking all computers/CPU's.
- The PVM system allows an optimum distribution of jobs on each CPU to accelerate the computation.
- No user interaction is required since the parallel computing environment is fully automated system.

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Appendix A.
Structural Finite Element Data for Classical Flutter Case

```
ID LMTAS BLOCK 40 F-16 FLUTTER FEM
SOL 103
TIME 20
$
CEND
$
TITLE=F-16 1/2 AIRPLANE FINITE ELEMENT MODEL FOR FLUTTER ANALYSIS
SUBTI=ANTI-SYMMETRIC CENTERLINE BOUNDARY CONDITIONS //
LABEL=CONFIG 5 = MA41
DISP=ALL
ECHO=SORT
$ DMIG VERTICAL TAIL STIFFNESS MATRIX
K2GG=VTAIL
$ EIGENVALUE EXTRACTION
METHOD=1
$ SYMMETRIC B.C. / SPC=2 FOR ANTISYMMETRIC
SPC=2
$
$ SET 203022=GRIDS USED IN FLUTTER ANALYSIS.
$ ADD GRIDS 801 THROUGH 814 FOR DYNAMIC RESPONSE.
$
SET 203022=   2,   3,   4,   5,   6,
              9,  11,  13,  15,  17,
             19,  20,  21,  26,  29,
             33,  39,  44,  47,  51,
             52,  53,  56,  60,  61,
             62,  64,  65,  68,  72,
             73,  74,  75,  77,  78,
             81,  85,  86,  87,  89,
             90,  91,  92,  93,  95,
            102, 103, 104, 105, 106,
            107, 108, 109, 110, 111,
            112, 113, 122, 123, 124,
            128, 129, 130, 131, 132,
            133,3004,3006,3009         $ AIM-9/16S200 OR 16S200 ON TIP
$
OUTPUT(PLOT)
CSCALE=1.8
PAPER SIZE=26. BY 20.
$
$ SET 10=ELEMENTS USED IN MODE PLOTS
$
$ FUSELAGE CENTERLINE
SET 10=  1 THRU   26,
$ WING BOX
       1001 THRU 1005,
       1007,1010 THRU 1013,
       1020,1023 THRU 1025,
       1031,1034,1036,1043,1045,
       1046,1048 THRU 1054,
       1056 THRU 1062,
       1071 THRU 1074,
       1078,1079,1080,
       1086 THRU 1090,
       1099,1100,1101,
       1075,1076,1077,
       1081 THRU 1085,
       1091 THRU 1097,
       1102 THRU 1111,
       1116 THRU 1125,
       1126,1127,1128,
$ LEADING EDGE FLAP / 1258 ACTUATOR
       1131 THRU 1134,
       1136,1137,1138,
       1140,1141,1142,
       1144,1145,1146,
       1148 THRU 1151,
       1152 THRU 1171,
$ FLAPERON
       1181 THRU 1185,
       1187 THRU 1189,
       1190 THRU 1194,
       1196 THRU 1203,
       1205 THRU 1207,
       1209 THRU 1220,
       1231 THRU 1238,
       1251 THRU 1258,
       1261 THRU 1268,
$ HORIZONTAL TAIL
       2001 THRU 2058,
$ VERTICAL TAIL
       2401 THRU 2460,
$ 16S200 // STATION 1,9
       3003 THRU 3009,
$ AIM-9L // STATION 1,9
       3014,3015
$
MAXIMUM DEFORMATION 35.
AXES MX,MY,Z
VIEW 60.0,30.,0.
FIND SCALE ORIGIN 10 SET 10
PLOT MODAL DEFO 0 SET 10 ORIGIN 10
$
$
BEGIN BULK
ASET    3500    123456
ASET    3501    123456
ASET1   1       163     153     154     155     156     71      286
ASET1   1       267
ASET1   1       284     281
ASET1   1       367     408     368     359     384
ASET1   1       373     364     381     383
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ASET1   1       386     391     371     362     387     392     393
ASET1   1       389     369     360     385     390     370     361
ASET1   1       410
ASET1   3       6       17      5       15      4       13      3
ASET1   3       11      2       9
ASET1   3       19      72      20      60      73      21      61
ASET1   3       39      47      56      68      81
ASET1   3       74      51      62      75      26      52      64
ASET1   3       77      29      44      53      65      78      33
ASET1   3       85      86      87      88
ASET1   3       90      103     109     89      102     108
ASET1   3       95      107     113     93      106     112     124
ASET1   3       130     133     92      105     111     123     129
ASET1   3       132     91      104     110     122     128     131
ASET1   3       233
ASET1   3       251     THRU    266
ASET1   3       3017    3019    3022
ASET1   5       153     154     155     156     71      286     284
ASET1   5       410
ASET1   5       459
ASET1   6       437     281     410
ASET1   6       458
ASET1   3456    3018
CBAR    27      27      284     410     1.      1.      0.
CBAR    2401    2401    407     367     0.      1.      1.
CBAR    2402    2402    367     368     0.      1.      1.
CBAR    2403    2403    368     369     0.      1.      1.
CBAR    2404    2404    369     370     0.      1.      1.
CBAR    2405    2405    370     371     0.      1.      1.
CBAR    2406    2406    371     372     0.      1.      1.
CBAR    2407    2407    372     373     0.      1.      1.
CBAR    2408    2408    357     358     0.      1.      1.
CBAR    2409    2409    358     359     0.      1.      1.
CBAR    2410    2410    359     360     0.      1.      1.
CBAR    2411    2411    360     361     0.      1.      1.
CBAR    2412    2412    361     362     0.      1.      1.
CBAR    2413    2413    362     363     0.      1.      1.
CBAR    2414    2414    363     364     0.      1.      1.
CBAR    2415    2415    409     375     0.      1.      1.
CBAR    2416    2416    375     376     0.      1.      1.
CBAR    2417    2417    376     377     0.      1.      1.
CBAR    2418    2418    377     378     0.      1.      1.
CBAR    2419    2419    378     379     0.      1.      1.
CBAR    2420    2420    379     380     0.      1.      1.
CBAR    2421    2421    380     381     0.      1.      1.
CBAR    2422    2422    382     383     0.      1.      1.
CBAR    2423    2423    384     385     0.      1.      1.
CBAR    2424    2424    385     386     0.      1.      1.
CBAR    2425    2425    386     387     0.      1.      1.
CBAR    2426    2426    387     388     0.      1.      1.
CBAR    2427    2427    389     390     0.      1.      1.
CBAR    2428    2428    390     391     0.      1.      1.
CBAR    2429    2429    391     392     0.      1.      1.
CBAR    2430    2430    392     393     0.      1.      1.
CBAR    2431    2431    407     357     0.      1.      1.
CBAR    2432    2432    357     409     0.      1.      1.
CBAR    2433    2433    367     358     0.      1.      1.
CBAR    2434    2434    358     375     0.      1.      1.
CBAR    2435    2435    375     384     0.      1.      1.
CBAR    2436    2436    375     406     0.      1.      1.
CBAR    2437    2437    406     408     0.      1.      1.
CBAR    2438    2438    368     359     0.      1.      1.
CBAR    2439    2439    359     376     0.      1.      1.
CBAR    2440    2440    376     384     0.      1.      1.
CBAR    2441    2441    369     360     0.      1.      1.
CBAR    2442    2442    360     377     0.      1.      1.
CBAR    2443    2443    377     385     0.      1.      1.
CBAR    2444    2444    370     361     0.      1.      1.
CBAR    2445    2445    361     378     0.      1.      1.
CBAR    2446    2446    378     386     0.      1.      1.
CBAR    2447    2447    371     362     0.      1.      1.
CBAR    2448    2448    362     379     0.      1.      1.
CBAR    2449    2449    372     363     0.      1.      1.
CBAR    2450    2450    363     380     0.      1.      1.
CBAR    2451    2451    380     382     0.      1.      1.
CBAR    2452    2452    380     388     0.      1.      1.
CBAR    2453    2453    373     364     0.      1.      1.
CBAR    2454    2454    364     381     0.      1.      1.
CBAR    2455    2455    381     383     0.      1.      1.
CBAR    2456    2456    384     389     0.      1.      1.
CBAR    2457    2457    385     390     0.      1.      1.
CBAR    2458    2458    386     391     0.      1.      1.
CBAR    2459    2459    387     392     0.      1.      1.
CBAR    2460    2460    388     393     0.      1.      1.
CBAR    3502    3502    3500    52      1.      1.      0.
CBAR    3503    3502    3501    52      1.      1.      0.
CBEAM   1       1       163     164     1.      0.      0.
CBEAM   2       2       164     153     1.      0.      0.
CBEAM   3       3       267     154     1.      0.      0.
CBEAM   4       4       154     155     1.      0.      0.
CBEAM   5       5       155     156     1.      0.      0.
CBEAM   6       6       268     36      1.      0.      0.
CBEAM   7       7       36      42      1.      0.      0.
CBEAM   8       8       42      50      1.      0.      0.
CBEAM   9       9       50      437     1.      0.      0.
CBEAM   10      10      437     59      1.      0.      0.
CBEAM   11      11      59      431     1.      0.      0.
CBEAM   12      12      431     71      1.      0.      0.
CBEAM   13      13      71      84      1.      0.      0.
CBEAM   14      14      84      298     1.      0.      0.
CBEAM   15      15      298     286     1.      0.      0.
CBEAM   16      16      286     117     1.      0.      0.
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CBEAM   17      17      117     285     1.      1.      0.
CBEAM   18      18      285     283     1.      1.      0.
CBEAM   19      19      283     284     1.      1.      0.
CBEAM   20      20      284     282     1.      1.      0.
CBEAM   21      21      282     281     1.      1.      0.
CBEAM   22      22      281     405     1.      0.      0.
CBEAM   31      31      36      35      1.      1.      0.
CBEAM   32      32      42      41      1.      1.      0.
CBEAM   33      33      50      49      1.      1.      0.
CBEAM   34      34      59      58      1.      1.      0.
CBEAM   35      35      71      70      1.      1.      0.
CBEAM   36      36      84      83      1.      1.      0.
CBEAM   37      37      117     116     1.      1.      0.
CBEAM   38      38      34      31      1.      1.      0.
CBEAM   39      39      40      37      1.      1.      0.
CBEAM   40      40      48      45      1.      1.      0.
CBEAM   41      41      57      54      1.      1.      0.
CBEAM   42      42      69      66      1.      1.      0.
CBEAM   43      43      82      94      1.      1.      0.
CBEAM   44      44      94      118     1.      1.      0.
CBEAM   45      45      118     121     1.      1.      0.
CBEAM   46      46      115     79      1.      1.      0.
CBEAM   47      47      79      120     1.      1.      0.
CBEAM   48      48      120     114     1.      1.      0.
CBEAM   49      49      31      37      1.      1.      0.              +49BM
+49BM   46
CBEAM   50      50      37      45      1.      1.      0.
CBEAM   51      51      45      54      1.      1.      0.
CBEAM   52      52      54      66      1.      1.      0.
CBEAM   53      53      66      121     1.      1.      0.              +53BM
+53BM           456
CBEAM   54      54      121     114     1.      1.      0.              +54BM
+54BM   456
CBEAM   55      55      118     119     1.      1.      0.
CBEAM   56      56      119     120     1.      1.      0.
CBEAM   57      57      94      79      1.      1.      0.
CBEAM   141     141     467     274     1.      1.      0.
CBEAM   142     142     274     465     1.      1.      0.
CBEAM   143     143     465     275     1.      1.      0.
CBEAM   144     144     275     278     1.      1.      0.
CBEAM   145     145     278     280     1.      1.      0.
CBEAM   146     146     280     292     1.      1.      0.
CBEAM   147     147     292     114     1.      1.      0.              +147BM
+147BM          456
CBEAM   148     148     466     273     1.      1.      0.
CBEAM   149     149     273     464     1.      1.      0.
CBEAM   150     150     464     276     1.      1.      0.
CBEAM   151     151     276     279     1.      1.      0.
CBEAM   152     152     279     290     1.      1.      0.
CBEAM   153     153     290     293     1.      1.      0.
CBEAM   154     154     293     79      1.      1.      0.              +154BM
+154BM          456
CBEAM   160     160     295     300     1.      1.      0.
CBEAM   161     161     117     300     1.      1.      0.
CBEAM   162     162     300     79      1.      1.      0.
CBEAM   163     163     79      114     1.      1.      0.
CBEAM   164     164     283     295     1.      1.      0.
CBEAM   165     165     295     294     1.      1.      0.
CBEAM   166     166     293     292     1.      1.      0.
CBEAM   167     167     282     291     1.      1.      0.
CBEAM   168     168     290     280     1.      1.      0.
CBEAM   169     169     279     271     1.      1.      0.              +169BM
+169BM  456
CBEAM   170     170     271     278     1.      1.      0.              +170BM
+170BM          56
CBEAM   171     171     281     277     1.      1.      0.
CBEAM   172     172     276     275     1.      1.      0.
CBEAM   173     173     464     465     1.      1.      0.
CBEAM   174     174     466     467     1.      1.      0.
CBEAM   175     175     271     272     1.      1.      0.              +175BM
+175BM  46
CBEAM   176     176     273     241     1.      1.      0.
CBEAM   177     177     241     299     1.      1.      0.
CBEAM   178     178     299     272     1.      1.      0.
CBEAM   179     179     272     274     1.      1.      0.
CBEAM   180     180     274     233     1.      1.      0.
CBEAM   181     181     195     296     1.      1.      0.              +181BM
+181BM  56
CBEAM   182     182     296     196     1.      1.      0.              +182BM
+182BM          56
CBEAM   1001    1001    33      39      1.      0.      0.
CBEAM   1002    1002    39      47      1.      0.      0.
CBEAM   1003    1003    47      56      1.      0.      0.
CBEAM   1004    1004    56      68      1.      0.      0.
CBEAM   1005    1005    68      81      1.      0.      0.
CBEAM   1007    1007    32      38      1.      0.      0.
CBEAM   1009    1009    30      38      1.      0.      0.
CBEAM   1010    1010    38      46      1.      0.      0.
CBEAM   1011    1011    46      55      1.      0.      0.
CBEAM   1012    1012    55      67      1.      0.      0.
CBEAM   1013    1013    67      80      1.      0.      0.
CBEAM   1014    1014    181     182     1.      0.      0.
CBEAM   1015    1015    182     183     1.      0.      0.
CBEAM   1016    1016    183     184     1.      0.      0.
CBEAM   1017    1017    184     185     1.      0.      0.
CBEAM   1018    1018    185     186     1.      0.      0.
CBEAM   1020    1020    29      44      1.      0.      0.
CBEAM   1022    1022    27      44      1.      0.      0.
CBEAM   1023    1023    44      53      1.      0.      0.
CBEAM   1024    1024    53      65      1.      0.      0.
CBEAM   1025    1025    65      78      1.      0.      0.
CBEAM   1026    1026    187     188     1.      0.      0.              +1026BM
+1026BM 56
CBEAM   1027    1027    188     189     1.      0.      0.
CBEAM   1028    1028    189     190     1.      0.      0.
CBEAM   1029    1029    190     191     1.      0.      0.
CBEAM   1031    1031    26      52      1.      0.      0.
CBEAM   1033    1033    25      52      1.      0.      0.
CBEAM   1034    1034    52      64      1.      0.      0.
CBEAM   1035    1035    64      245     1.      0.      0.
CBEAM   1036    1036    64      77      1.      0.      0.
CBEAM   1037    1037    245     77      1.      0.      0.
CBEAM   1038    1038    192     193     1.      0.      0.
CBEAM   1039    1039    193     63      1.      0.      0.
CBEAM   1040    1040    63      245     1.      0.      0.
CBEAM   1041    1041    245     76      1.      0.      0.
CBEAM   1043    1043    24      51      1.      0.      0.
CBEAM   1045    1045    23      51      1.      0.      0.
CBEAM   1046    1046    51      62      1.      0.      0.
CBEAM   1047    1047    22      62      1.      0.      0.
CBEAM   1048    1048    62      244     1.      0.      0.
CBEAM   1049    1049    244     75      1.      0.      0.
CBEAM   1050    1050    75      88      1.      0.      0.              +1050BM
CBEAM   1051    1051    21      61      1.      0.      0.
CBEAM   1052    1052    61      243     1.      0.      0.
CBEAM   1053    1053    243     74      1.      0.      0.              +1053BM
+1053BM         56
CBEAM   1054    1054    74      87      1.      0.      0.              +1054BM
CBEAM   1056    1056    20      60      1.      0.      0.
CBEAM   1057    1057    60      242     1.      0.      0.
CBEAM   1058    1058    242     73      1.      0.      0.              +1058BM
+1058BM         56
CBEAM   1059    1059    73      86      1.      0.      0.              +1059BM
CBEAM   1060    1060    19      143     1.      0.      0.
CBEAM   1061    1061    143     72      1.      0.      0.
CBEAM   1062    1062    72      85      1.      0.      0.              +1062BM
CBEAM   1071    1071    33      32      0.      1.      0.
CBEAM   1072    1072    32      30      0.      1.      0.
CBEAM   1073    1073    30      181     0.      1.      0.
CBEAM   1074    1074    181     29      0.      1.      0.
CBEAM   1075    1075    39      38      0.      1.      0.
CBEAM   1076    1076    38      182     0.      1.      0.
CBEAM   1077    1077    182     29      0.      1.      0.
CBEAM   1078    1078    29      27      0.      1.      0.
CBEAM   1079    1079    27      187     0.      1.      0.
CBEAM   1080    1080    187     26      0.      1.      0.
CBEAM   1081    1081    47      46      0.      1.      0.
CBEAM   1082    1082    46      183     0.      1.      0.
CBEAM   1083    1083    183     44      0.      1.      0.
CBEAM   1084    1084    44      188     0.      1.      0.
CBEAM   1085    1085    188     26      0.      1.      0.
CBEAM   1086    1086    26      25      0.      1.      0.
CBEAM   1087    1087    25      192     0.      1.      0.
CBEAM   1088    1088    192     24      0.      1.      0.
CBEAM   1089    1089    24      23      0.      1.      0.
CBEAM   1090    1090    23      22      0.      1.      0.
CBEAM   1091    1091    56      55      0.      1.      0.
CBEAM   1092    1092    55      184     0.      1.      0.
CBEAM   1093    1093    184     53      0.      1.      0.
CBEAM   1094    1094    53      189     0.      1.      0.
CBEAM   1095    1095    189     52      0.      1.      0.
CBEAM   1096    1096    52      193     0.      1.      0.
CBEAM   1097    1097    193     51      0.      1.      0.
CBEAM   1098    1098    51      22      0.      1.      0.              +1098BM
+1098BM         56
CBEAM   1099    1099    22      21      0.      1.      0.
CBEAM   1100    1100    21      20      0.      1.      0.
CBEAM   1101    1101    20      19      0.      1.      0.
CBEAM   1102    1102    68      67      0.      1.      0.
CBEAM   1103    1103    67      185     0.      1.      0.
CBEAM   1104    1104    185     65      0.      1.      0.
CBEAM   1105    1105    65      190     0.      1.      0.
CBEAM   1106    1106    190     64      0.      1.      0.
CBEAM   1107    1107    64      63      0.      1.      0.
CBEAM   1108    1108    63      62      0.      1.      0.
CBEAM   1109    1109    62      61      0.      1.      0.
CBEAM   1110    1110    61      60      0.      1.      0.
CBEAM   1111    1111    60      19      0.      1.      0.
CBEAM   1112    1112    245     244     0.      1.      0.
CBEAM   1113    1113    244     243     0.      1.      0.
CBEAM   1114    1114    243     242     0.      1.      0.
CBEAM   1115    1115    242     143     0.      1.      0.
CBEAM   1116    1116    81      80      0.      1.      0.
CBEAM   1117    1117    80      186     0.      1.      0.
CBEAM   1118    1118    186     78      0.      1.      0.
CBEAM   1119    1119    78      191     0.      1.      0.
CBEAM   1120    1120    191     77      0.      1.      0.
CBEAM   1121    1121    77      76      0.      1.      0.
CBEAM   1122    1122    76      75      0.      1.      0.
CBEAM   1123    1123    75      74      0.      1.      0.
CBEAM   1124    1124    74      73      0.      1.      0.
CBEAM   1125    1125    73      72      0.      1.      0.
CBEAM   1126    1126    88      87      0.      1.      0.              +1126BM
CBEAM   1127    1127    87      86      0.      1.      0.
CBEAM   1128    1128    86      85      0.      1.      0.              +1128BM
CBEAM   1131    1131    7       18      1.      0.      0.
CBEAM   1132    1132    6       16      1.      0.      0.
CBEAM   1133    1133    16      17      1.      0.      0.
CBEAM   1134    1134    17      30      1.      0.      0.              +BM1134
+BM1134 5
CBEAM   1135    1135    176     180     1.      0.      0.
CBEAM   1136    1136    5       14      1.      0.      0.
CBEAM   1137    1137    14      15      1.      0.      0.
CBEAM   1138    1138    15      27      1.      0.      0.              +BM1138
+BM1138 5
CBEAM   1139    1139    175     179     1.      0.      0.
CBEAM   1140    1140    4       12      1.      0.      0.
CBEAM   1141    1141    12      13      1.      0.      0.
CBEAM   1142    1142    13      25      1.      0.      0.              +BM1142
+BM1142 5
CBEAM   1143    1143    174     178     1.      0.      0.
CBEAM   1144    1144    3       10      1.      0.      0.
CBEAM   1145    1145    10      11      1.      0.      0.
CBEAM   1146    1146    11      23      1.      0.      0.              +BM1146
+BM1146 5
CBEAM   1147    1147    173     177     1.      0.      0.
CBEAM   1148    1148    2       194     1.      0.      0.
CBEAM   1149    1149    194     9       1.      0.      0.
CBEAM   1150    1150    9       20      1.      0.      0.              +BM1150
+BM1150 5
CBEAM   1151    1151    1       8       1.      0.      0.
CBEAM   1152    1152    6       7       1.      0.      0.
CBEAM   1153    1153    176     6       1.      0.      0.
CBEAM   1154    1154    5       176     1.      0.      0.
CBEAM   1155    1155    175     5       1.      0.      0.
CBEAM   1156    1156    4       175     1.      0.      0.
CBEAM   1157    1157    174     4       1.      0.      0.
CBEAM   1158    1158    3       174     1.      0.      0.
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CBEAM   1159    1159    173     3       1.      0.      0.
CBEAM   1160    1160    2       173     1.      0.      0.
CBEAM   1161    1161    1       2       1.      0.      0.
CBEAM   1162    1162    16      18      1.      0.      0.
CBEAM   1163    1163    180     16      1.      0.      0.
CBEAM   1164    1164    14      180     1.      0.      0.
CBEAM   1165    1165    179     14      1.      0.      0.
CBEAM   1166    1166    12      179     1.      0.      0.
CBEAM   1167    1167    178     12      1.      0.      0.
CBEAM   1168    1168    10      178     1.      0.      0.
CBEAM   1169    1169    177     10      1.      0.      0.
CBEAM   1170    1170    194     177     1.      0.      0.
CBEAM   1171    1171    8       194     1.      0.      0.
CBEAM   1181    1181    81      95      1.      0.      0.              +BM1181
+BM1181         456
CBEAM   1182    1182    95      142     1.      0.      0.
CBEAM   1183    1183    142     101     1.      0.      0.
CBEAM   1184    1184    101     107     1.      0.      0.
CBEAM   1185    1185    107     113     1.      0.      0.
CBEAM   1186    1186    93      141     1.      0.      0.
CBEAM   1187    1187    141     100     1.      0.      0.
CBEAM   1188    1188    100     106     1.      0.      0.
CBEAM   1189    1189    106     112     1.      0.      0.
CBEAM   1190    1190    186     124     1.      0.      0.              +BM1190
+BM1190         456
CBEAM   1191    1191    124     140     1.      0.      0.
CBEAM   1192    1192    140     127     1.      0.      0.
CBEAM   1193    1193    127     130     1.      0.      0.
CBEAM   1194    1194    130     133     1.      0.      0.
CBEAM   1195    1195    92      139     1.      0.      0.
CBEAM   1196    1196    139     99      1.      0.      0.
CBEAM   1197    1197    99      105     1.      0.      0.
CBEAM   1198    1198    105     111     1.      0.      0.
CBEAM   1199    1199    191     123     1.      0.      0.              +BM1199
+BM1199         456
CBEAM   1200    1200    123     138     1.      0.      0.
CBEAM   1201    1201    138     126     1.      0.      0.
CBEAM   1202    1202    126     129     1.      0.      0.
CBEAM   1203    1203    129     132     1.      0.      0.
CBEAM   1204    1204    91      137     1.      0.      0.
CBEAM   1205    1205    137     98      1.      0.      0.
CBEAM   1206    1206    98      104     1.      0.      0.
CBEAM   1207    1207    104     110     1.      0.      0.
CBEAM   1208    1208    122     136     1.      0.      0.
CBEAM   1209    1209    136     125     1.      0.      0.
CBEAM   1210    1210    125     128     1.      0.      0.
CBEAM   1211    1211    128     131     1.      0.      0.
CBEAM   1212    1212    76      90      1.      0.      0.              +BM1212
+BM1212         456
CBEAM   1213    1213    90      135     1.      0.      0.
CBEAM   1214    1214    135     97      1.      0.      0.
CBEAM   1215    1215    97      103     1.      0.      0.
CBEAM   1216    1216    103     109     1.      0.      0.
CBEAM   1217    1217    89      134     1.      0.      0.
CBEAM   1218    1218    134     96      1.      0.      0.
CBEAM   1219    1219    96      102     1.      0.      0.
CBEAM   1220    1220    102     108     1.      0.      0.
CBEAM   1231    1231    141     142     1.      0.      0.
CBEAM   1232    1232    140     141     1.      0.      0.
CBEAM   1233    1233    139     140     1.      0.      0.
CBEAM   1234    1234    138     139     1.      0.      0.
CBEAM   1235    1235    137     138     1.      0.      0.
CBEAM   1236    1236    136     137     1.      0.      0.
CBEAM   1237    1237    135     136     1.      0.      0.
CBEAM   1238    1238    134     135     1.      0.      0.
CBEAM   1241    1241    100     101     1.      0.      0.
CBEAM   1242    1242    127     100     1.      0.      0.
CBEAM   1243    1243    99      127     1.      0.      0.
CBEAM   1244    1244    126     99      1.      0.      0.
CBEAM   1245    1245    98      126     1.      0.      0.
CBEAM   1246    1246    125     98      1.      0.      0.
CBEAM   1247    1247    97      125     1.      0.      0.
CBEAM   1248    1248    96      97      1.      0.      0.
CBEAM   1251    1251    106     107     1.      0.      0.
CBEAM   1252    1252    130     106     1.      0.      0.
CBEAM   1253    1253    105     130     1.      0.      0.
CBEAM   1254    1254    129     105     1.      0.      0.
CBEAM   1255    1255    104     129     1.      0.      0.
CBEAM   1256    1256    128     104     1.      0.      0.
CBEAM   1257    1257    103     128     1.      0.      0.
CBEAM   1258    1258    102     103     1.      0.      0.
CBEAM   1261    1261    112     113     1.      0.      0.
CBEAM   1262    1262    133     112     1.      0.      0.
CBEAM   1263    1263    111     133     1.      0.      0.
CBEAM   1264    1264    132     111     1.      0.      0.
CBEAM   1265    1265    110     132     1.      0.      0.
CBEAM   1266    1266    131     110     1.      0.      0.
CBEAM   1267    1267    109     131     1.      0.      0.
CBEAM   1268    1268    108     109     1.      0.      0.
CBEAM   2001    2001    251     506     1.      1.      0.              +BM2001
+BM2001 456
CBEAM   2002    2002    506     233     1.      1.      0.
CBEAM   2003    2003    233     517     1.      1.      0.
CBEAM   2004    2004    517     262     1.      1.      0.              +BM2004
+BM2004         456
CBEAM   2005    2005    252     507     1.      1.      0.              +BM2005
+BM2005 456
CBEAM   2006    2006    507     257     1.      1.      0.
CBEAM   2007    2007    257     518     1.      1.      0.
CBEAM   2008    2008    518     262     1.      1.      0.              +BM2008
+BM2008         456
CBEAM   2009    2009    253     508     1.      1.      0.              +BM2009
+BM2009 456
CBEAM   2010    2010    508     258     1.      1.      0.
CBEAM   2011    2011    258     519     1.      1.      0.
CBEAM   2012    2012    519     263     1.      1.      0.              +BM2012
+BM2012         456
CBEAM   2013    2013    254     509     1.      1.      0.              +BM2013
+BM2013 456
CBEAM   2014    2014    509     259     1.      1.      0.
CBEAM   2015    2015    259     520     1.      1.      0.
CBEAM   2016    2016    520     264     1.      1.      0.              +BM2016
+BM2016         456
CBEAM   2017    2017    255     510     1.      1.      0.              +BM2017
+BM2017 456
CBEAM   2018    2018    510     260     1.      1.      0.
CBEAM   2019    2019    260     521     1.      1.      0.
CBEAM   2020    2020    521     265     1.      1.      0.              +BM2020
+BM2020         456
CBEAM   2021    2021    256     511     1.      1.      0.              +BM2021
+BM2021 456
CBEAM   2022    2022    511     261     1.      1.      0.              +BM2022
+BM2022         456
CBEAM   2023    2023    261     522     1.      1.      0.              +BM2023
+BM2023 456
CBEAM   2024    2024    522     266     1.      1.      0.              +BM2024
+BM2024         456
CBEAM   2031    2031    251     501     1.      1.      0.              +BM2031
+BM2031 456
CBEAM   2032    2032    501     252     1.      1.      0.
CBEAM   2033    2033    252     502     1.      1.      0.
CBEAM   2034    2034    502     253     1.      1.      0.
CBEAM   2035    2035    253     503     1.      1.      0.
CBEAM   2036    2036    503     254     1.      1.      0.
CBEAM   2037    2037    254     504     1.      1.      0.
CBEAM   2038    2038    504     255     1.      1.      0.
CBEAM   2039    2039    255     505     1.      1.      0.
CBEAM   2040    2040    505     256     1.      1.      0.              +BM2040
+BM2040         456
CBEAM   2041    2041    233     512     1.      1.      0.
CBEAM   2042    2042    512     257     1.      1.      0.
CBEAM   2043    2043    257     513     1.      1.      0.
CBEAM   2044    2044    513     258     1.      1.      0.
CBEAM   2045    2045    258     514     1.      1.      0.
CBEAM   2046    2046    514     259     1.      1.      0.
CBEAM   2047    2047    259     515     1.      1.      0.
CBEAM   2048    2048    515     260     1.      1.      0.
CBEAM   2049    2049    260     516     1.      1.      0.
CBEAM   2050    2050    516     261     1.      1.      0.              +BM2050
+BM2050         456
CBEAM   2051    2051    262     523     1.      1.      0.              +BM2051
+BM2051 456
CBEAM   2052    2052    523     263     1.      1.      0.
CBEAM   2053    2053    263     524     1.      1.      0.
CBEAM   2054    2054    524     264     1.      1.      0.
CBEAM   2055    2055    264     525     1.      1.      0.
CBEAM   2056    2056    525     265     1.      1.      0.
CBEAM   2057    2057    265     526     1.      1.      0.
CBEAM   2058    2058    526     266     1.      1.      0.              +BM2058
+BM2058         456
CBEAM   3026    3026    19      3020    0.      1.      0.
CBEAM   3027    3027    3016    3021    0.      1.      0.
CBEAM   3028    3028    3017    3018    1.      0.      0.
CBEAM   3029    3029    3018    3019    1.      0.      0.
CBEAM   3030    3030    3019    3020    1.      0.      0.
CBEAM   3031    3031    3020    3021    1.      0.      0.
CBEAM   3032    3032    3021    3022    1.      0.      0.              +3032
+3032           5
CBEAM   5002    5002    153     267     1.      0.      0.
CBEAM   5051    5051    156     458     1.      0.      0.
CBEAM   5052    5052    458     459     1.      0.      0.
CBEAM   5053    5053    459     268     1.      0.      0.
CELAS2  61      36.6E6  34      5       35      5
CELAS2  62      71.0E6  40      5       41      5
CELAS2  63      94.1E6  48      5       49      5
CELAS2  64      132.4E6 57      5       58      5
CELAS2  65      110.0E6 69      5       70      5
CELAS2  66      51.7E6  82      5       83      5
CELAS2  67      5.0E6   115     5       116     5
CELAS2  191     11.25E6 277     5       276     5
CELAS2  192     22.0E6  291     5       290     5
CELAS2  193     9.68E6  294     5       293     5
CELAS2  194     156610. 298     3       195     3
CELAS2  195     67829.  284     3       196     3
CELAS2  1172    5650000.17      4       30      4
CELAS2  1173    5590000.15      4       27      4
CELAS2  1174    1600000.13      4       25      4
CELAS2  1175    2030000.11      4       23      4
CELAS2  1221    3307000.142     4       141     4
CELAS2  1222    268300. 141     4       140     4
CELAS2  1223    137300. 140     4       139     4
CELAS2  1224    105200. 139     4       138     4
CELAS2  1225    85600.  138     4       137     4
CELAS2  1226    69900.  137     4       136     4
CELAS2  1227    57700.  136     4       135     4
CELAS2  1228    40000.  135     4       134     4
CELAS2  1229    6229750.142     4       119     4
CONM1   301     19      0                                               +301
+301    9.565
CONM1   302     72      0                                               +302
+302    6.770
CONM1   303     20      0                                               +303
+303    7.972
CONM1   304     60      0                                               +304
+304    10.110
CONM1   305     73      0                                               +305
+305    7.755
CONM1   306     21      0                                               +306
+306    13.712
CONM1   307     61      0                                               +307
+307    20.285
CONM1   308     74      0                                               +308
+308    9.982
CONM1   309     51      0                                               +309
+309    32.156
CONM1   310     62      0                                               +310
+310    25.281
CONM1   311     75      0                                               +311
+311    14.285
CONM1   312     26      0                                               +312
+312    42.942
CONM1   313     52      0                                               +313
+313    57.288
CONM1   314     64      0                                               +314
+314    46.648
CONM1   315     77      0                                               +315
+315    20.983
CONM1   316     29      0                                               +316
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+316    60.677
CONM1   317     44      0                                               +317
+317    80.964
CONM1   318     53      0                                               +318
+318    74.861
CONM1   319     65      0                                               +319
+319    56.266
CONM1   320     78      0                                               +320
+320    28.341
CONM1   321     33      0                                               +321
+321    37.854
CONM1   322     39      0                                               +322
+322    99.621
CONM1   323     47      0                                               +323
+323    105.244
CONM1   324     56      0                                               +324
+324    95.811
CONM1   325     68      0                                               +325
+325    83.620
CONM1   326     81      0                                               +326
+326    33.148
CONM1   341     85      0                                               +341
+341    .6
CONM1   342     86      0                                               +342
+342    1.6
CONM1   343     87      0                                               +343
+343    1.8
CONM1   344     88      0                                               +344
+344    1.
CONM1   345     6       0                                               +345
+345    12.03
CONM1   346     17      0                                               +346
+346    57.78
CONM1   347     5       0                                               +347
+347    10.08
CONM1   348     15      0                                               +348
+348    42.72
CONM1   349     4       0                                               +349
+349    6.92
CONM1   350     13      0                                               +350
+350    27.67
CONM1   351     3       0                                               +351
+351    5.17
CONM1   352     11      0                                               +352
+352    27.65
CONM1   353     2       0                                               +353
+353    4.08
CONM1   354     9       0                                               +354
+354    3.71
CONM1   355     95      0                                               +355
+355    9.133
CONM1   356     107     0                                               +356
+356    6.765
CONM1   357     113     0                                               +357
+357    .022
CONM1   358     93      0                                               +358
+358    10.32
CONM1   359     106     0                                               +359
+359    10.12
CONM1   360     112     0                                               +360
+360    .149
CONM1   361     124     0                                               +361
+361    5.816
CONM1   362     130     0                                               +362
+362    7.986
CONM1   363     133     0                                               +363
+363    .998
CONM1   364     92      0                                               +364
+364    4.56
CONM1   365     105     0                                               +365
+365    6.797
CONM1   366     111     0                                               +366
+366    .952
CONM1   367     123     0                                               +367
+367    3.296
CONM1   368     129     0                                               +368
+368    4.727
CONM1   369     132     0                                               +369
+369    .647
CONM1   370     91      0                                               +370
+370    2.069
CONM1   371     104     0                                               +371
+371    3.014
CONM1   372     110     0                                               +372
+372    .477
CONM1   373     122     0                                               +373
+373    1.784
CONM1   374     128     0                                               +374
+374    2.632
CONM1   375     131     0                                               +375
+375    .435
CONM1   376     90      0                                               +376
+376    1.644
CONM1   377     103     0                                               +377
+377    2.354
CONM1   378     109     0                                               +378
+378    .272
CONM1   379     89      0                                               +379
+379    .651
CONM1   380     102     0                                               +380
+380    1.075
CONM1   381     108     0                                               +381
+381    .284
CONM1   391     163     0                                               +391
+391    314.21
CONM1   392     153     0                                               +392
+392    463.77
CONM1   393     154     0                                               +393
+393    870.68
CONM1   394     155     0                                               +394
+394    1299.38
CONM1   395     156     0                                               +395
+395    1545.78
CONM1   396     42      0                                               +396
+396    1799.25
CONM1   397     71      0                                               +397
+397    1412.77
CONM1   398     286     0                                               +398
+398    893.77
CONM1   399     284     0                                               +399
+399    335.19
CONM1   400     281     0                                               +400
+400    708.33
CONM1   401     163     0       314.21
CONM1   402     153     0       463.77
CONM1   403     154     0       870.68
CONM1   404     155     0       1299.38
CONM1   405     156     0       1545.78
CONM1   406     42      0       2036.16
CONM1   407     71      0       2468.11
CONM1   408     286     0       893.77
CONM1   409     284     0       311.29
CONM1   410     281     0       796.72
CONM1   411     153     0                                               +411
+411                                                                    +411A
+411A           119126.
CONM1   412     154     0                                               +412
+412                                                                    +412A
+412A           498740.
CONM1   413     155     0                                               +413
+413                                                                    +413A
+413A           233410.
CONM1   414     156     0                                               +414
+414                                                                    +414A
+414A           865169.
CONM1   415     42      0                                               +415
+415                                                                    +415A
+415A           1051483.
CONM1   416     71      0                                               +416
+416                                                                    +416A
+416A           1042917.
CONM1   417     286     0                                               +417
+417                                                                    +417A
+417A           556929.
CONM1   418     284     0                                               +418
+418                                                                    +418A
+418A           756147.
CONM1   430     195     0                                               +430
+430    -82.94
CONM1   431     296     0                                               +431
+431                                    3803477.
CONM1   432     296     0                                               +432
+432    2073.44
CONM1   433     42      0                       12204.0
CONM1   434     437     0                                               +434
+434                                                                    +434A
+434A                                                   19.7E6
CONM1   435     281     0                                               +435
+435                                                                    +435A
+435A                                                   945062.
CONM1   436     410     0                                               +436
+436                                                                    +436A
+436A           502624.
CONM1   437     410     0                                               +437
+437                                                                    +437A
+437A                                                   3604069.
CONM1   438     410     0       1990.5
CONM1   446     251     0                                               +446
+446    4.65
CONM1   447     252     0                                               +447
+447    5.123
CONM1   448     253     0                                               +448
+448    4.812
CONM1   449     254     0                                               +449
+449    3.069
CONM1   450     255     0                                               +450
+450    1.73
CONM1   451     256     0                                               +451
+451    2.547
CONM1   452     233     0                                               +452
+452    176.302
CONM1   453     257     0                                               +453
+453    31.053
CONM1   454     258     0                                               +454
+454    17.674
CONM1   455     259     0                                               +455
+455    11.742
CONM1   456     260     0                                               +456
+456    7.391
CONM1   457     261     0                                               +457
+457    2.877
CONM1   458     262     0                                               +458
+458    3.675
CONM1   459     263     0                                               +459
+459    3.064
CONM1   460     264     0                                               +460
+460    2.838
CONM1   461     265     0                                               +461
+461    2.73
CONM1   462     266     0                                               +462
+462    .976
CONM1   501     407     0       18.24
CONM1   502     409     0       24.64
CONM1   503     367     0       23.43
CONM1   504     408     0       30.93
CONM1   505     368     0       4.55
CONM1   506     359     0       15.9
CONM1   507     384     0       15.24
CONM1   508     389     0       .75
CONM1   509     369     0       3.81
CONM1   510     360     0       6.67
CONM1   511     385     0       5.77
CONM1   512     390     0       1.11
CONM1   513     370     0       2.55
CONM1   514     361     0       3.55
CONM1   515     386     0       3.1
CONM1   516     391     0       .93
CONM1   517     371     0       1.12
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CONM1   518     362     0       2.9
CONM1   519     387     0       2.4
CONM1   520     392     0       .59
CONM1   521     393     0       .37
CONM1   522     373     0       1.94
CONM1   523     364     0       .48
CONM1   524     381     0       2.66
CONM1   525     383     0       .89
CONM1   526     281                                                     +526
+526                                    822933.
CONM1   3042    3018            56.69           56.69                   +3042
+3042   50.69                           38266.                          +3042A
+3042A          0.                                              35266.
CONM1   3043    3019                                                    +3043
+3043   -4.70
CONM1   3044    3022            35.01           35.01                   +3044
+3044   50.01
CONM1   3047    3017                                                    +3047
+3047   .010
CONM2   3501    3500            502.    0.      -2.     0.              +000001
++000001698549.2        8160.8                  649152.0                +000002
CONM2   3504    3501            138.    0.      0.      0.              +000003
++00000366538.01        6769.7                  62828.60                +000004
CONROD  183     272     233     2               16.0875
CONROD  2201    233     1233    2       .0001
CONROD  2202    233     2233    2       .0001
CONROD  2203    251     1251    2       .0001
CONROD  2204    251     2251    2       .0001
CONROD  2205    252     1252    2       .0001
CONROD  2206    252     2252    2       .0001
CONROD  2207    253     1253    2       .0001
CONROD  2208    253     2253    2       .0001
CONROD  2209    254     1254    2       .0001
CONROD  2210    254     2254    2       .0001
CONROD  2211    255     1255    2       .0001
CONROD  2212    255     2255    2       .0001
CONROD  2213    256     1256    2       .0001
CONROD  2214    256     2256    2       .0001
CONROD  2215    257     1257    2       .0001
CONROD  2216    257     2257    2       .0001
CONROD  2217    258     1258    2       .0001
CONROD  2218    258     2258    2       .0001
CONROD  2219    259     1259    2       .0001
CONROD  2220    259     2259    2       .0001
CONROD  2221    260     1260    2       .0001
CONROD  2222    260     2260    2       .0001
CONROD  2223    261     1261    2       .0001
CONROD  2224    261     2261    2       .0001
CONROD  2225    262     1262    2       .0001
CONROD  2226    262     2262    2       .0001
CONROD  2227    263     1263    2       .0001
CONROD  2228    263     2263    2       .0001
CONROD  2229    264     1264    2       .0001
CONROD  2230    264     2264    2       .0001
CONROD  2231    265     1265    2       .0001
CONROD  2232    265     2265    2       .0001
CONROD  2233    266     1266    2       .0001
CONROD  2234    266     2266    2       .0001
CONROD  3033    3018    3020    2               20.
CONROD  3034    3020    3022    2               20.
CORD1R  5       701     702     703
CORD2C *3               0               -63.574         -294.247        *CORD3A
*CORD3A 0.              -143.398002     -351.530085     0.              +CORD3B
+CORD3B -63.574 -294.247100.
CORD2R  1       0       -62.153 -293.2270.      -62.153 -293.227100.    *CORD1
*CORD1  19.092002       -234.923915     0.
CORD2R  7       0       -41.5   -378.02 0.      -41.5   -378.02 100.    *CORD7
*CORD7  57.2946361      -362.5403399    0.
CQUAD4  601     601     1033    1039    1038    1032
CQUAD4  602     602     1039    1047    1046    1038
CQUAD4  603     603     1047    1056    1055    1046
CQUAD4  604     604     1056    1068    1067    1055
CQUAD4  605     605     1068    1081    1080    1067
CQUAD4  607     607     1038    1182    1181    1030
CQUAD4  608     608     1038    1046    1183    1182
CQUAD4  609     609     1046    1055    1184    1183
CQUAD4  610     610     1055    1067    1185    1184
CQUAD4  611     611     1067    1080    1186    1185
CQUAD4  613     613     1182    1183    1044    1029
CQUAD4  614     614     1183    1184    1053    1044
CQUAD4  615     615     1184    1185    1065    1053
CQUAD4  616     616     1185    1186    1078    1065
CQUAD4  618     618     1027    1044    1188    1187
CQUAD4  619     619     1044    1053    1189    1188
CQUAD4  620     620     1053    1065    1190    1189
CQUAD4  621     621     1065    1078    1191    1190
CQUAD4  623     623     1188    1189    1052    1026
CQUAD4  624     624     1189    1190    1064    1052
CQUAD4  625     625     1190    1191    1077    1064
CQUAD4  627     627     1025    1052    1193    1192
CQUAD4  628     628     1052    1064    1063    1193
CQUAD4  632     632     1192    1193    1051    1024
CQUAD4  633     633     1193    1063    1062    1051
CQUAD4  634     634     1063    1245    1244    1062
CQUAD4  635     635     1245    1076    1075    1244
CQUAD4  639     639     1062    1061    1021    1022
CQUAD4  640     640     1062    1244    1243    1061
CQUAD4  641     641     1244    1075    1074    1243
CQUAD4  643     643     1021    1061    1060    1020
CQUAD4  644     644     1061    1243    1242    1060
CQUAD4  645     645     1243    1074    1073    1242
CQUAD4  648     648     1060    1242    1143    1019
CQUAD4  649     649     1242    1073    1072    1143
CQUAD4  661     661     1142    1101    1100    1141
CQUAD4  662     662     1101    1107    1106    1100
CQUAD4  663     663     1107    1113    1112    1106
CQUAD4  664     664     1141    1100    1127    1140
CQUAD4  665     665     1100    1106    1130    1127
CQUAD4  666     666     1106    1112    1133    1130
CQUAD4  667     667     1140    1127    1099    1139
CQUAD4  668     668     1127    1130    1105    1099
CQUAD4  669     669     1130    1133    1111    1105
CQUAD4  670     670     1139    1099    1126    1138
CQUAD4  671     671     1099    1105    1129    1126
CQUAD4  672     672     1105    1111    1132    1129
CQUAD4  673     673     1138    1126    1098    1137
CQUAD4  674     674     1126    1129    1104    1098
CQUAD4  675     675     1129    1132    1110    1104
CQUAD4  676     676     1137    1098    1125    1136
CQUAD4  677     677     1098    1104    1128    1125
CQUAD4  678     678     1104    1110    1131    1128
CQUAD4  679     679     1136    1125    1097    1135
CQUAD4  680     680     1125    1128    1103    1097
CQUAD4  681     681     1128    1131    1109    1103
CQUAD4  682     682     1135    1097    1096    1134
CQUAD4  683     683     1097    1103    1102    1096
CQUAD4  684     684     1103    1109    1108    1102
CQUAD4  1601    601     2033    2039    2038    2032
CQUAD4  1602    602     2039    2047    2046    2038
CQUAD4  1603    603     2047    2056    2055    2046
CQUAD4  1604    604     2056    2068    2067    2055
CQUAD4  1605    605     2068    2081    2080    2067
CQUAD4  1607    607     2038    2182    2181    2030
CQUAD4  1608    608     2038    2046    2183    2182
CQUAD4  1609    609     2046    2055    2184    2183
CQUAD4  1610    610     2055    2067    2185    2184
CQUAD4  1611    611     2067    2080    2186    2185
CQUAD4  1613    613     2182    2183    2044    2029
CQUAD4  1614    614     2183    2184    2053    2044
CQUAD4  1615    615     2184    2185    2065    2053
CQUAD4  1616    616     2185    2186    2078    2065
CQUAD4  1618    618     2027    2044    2188    2187
CQUAD4  1619    619     2044    2053    2189    2188
CQUAD4  1620    620     2053    2065    2190    2189
CQUAD4  1621    621     2065    2078    2191    2190
CQUAD4  1623    623     2188    2189    2052    2026
CQUAD4  1624    624     2189    2190    2064    2052
CQUAD4  1625    625     2190    2191    2077    2064
CQUAD4  1627    627     2025    2052    2193    2192
CQUAD4  1628    628     2052    2064    2063    2193
CQUAD4  1632    632     2192    2193    2051    2024
CQUAD4  1633    633     2193    2063    2062    2051
CQUAD4  1634    634     2063    2245    2244    2062
CQUAD4  1635    635     2245    2076    2075    2244
CQUAD4  1639    639     2062    2061    2021    2022
CQUAD4  1640    640     2062    2244    2243    2061
CQUAD4  1641    641     2244    2075    2074    2243
CQUAD4  1643    643     2021    2061    2060    2020
CQUAD4  1644    644     2061    2243    2242    2060
CQUAD4  1645    645     2243    2074    2073    2242
CQUAD4  1648    648     2060    2242    2143    2019
CQUAD4  1649    649     2242    2073    2072    2143
CQUAD4  1661    661     2142    2101    2100    2141
CQUAD4  1662    662     2101    2107    2106    2100
CQUAD4  1663    663     2107    2113    2112    2106
CQUAD4  1664    664     2141    2100    2127    2140
CQUAD4  1665    665     2100    2106    2130    2127
CQUAD4  1666    666     2106    2112    2133    2130
CQUAD4  1667    667     2140    2127    2099    2139
CQUAD4  1668    668     2127    2130    2105    2099
CQUAD4  1669    669     2130    2133    2111    2105
CQUAD4  1670    670     2139    2099    2126    2138
CQUAD4  1671    671     2099    2105    2129    2126
CQUAD4  1672    672     2105    2111    2132    2129
CQUAD4  1673    673     2138    2126    2098    2137
CQUAD4  1674    674     2126    2129    2104    2098
CQUAD4  1675    675     2129    2132    2110    2104
CQUAD4  1676    676     2137    2098    2125    2136
CQUAD4  1677    677     2098    2104    2128    2125
CQUAD4  1678    678     2104    2110    2131    2128
CQUAD4  1679    679     2136    2125    2097    2135
CQUAD4  1680    680     2125    2128    2103    2097
CQUAD4  1681    681     2128    2131    2109    2103
CQUAD4  1682    682     2135    2097    2096    2134
CQUAD4  1683    683     2097    2103    2102    2096
CQUAD4  1684    684     2103    2109    2108    2102
CQUAD8  701     701     1257    1252    1251    1233    1507    1501    +701
+701    1506    1512                                    99.5
CQUAD8  702     702     1252    1257    1258    1253    1507    1513    +702
+702    1508    1502                                    99.5
CQUAD8  703     703     1253    1258    1259    1254    1508    1514    +703
+703    1509    1503                                    99.5
CQUAD8  704     704     1254    1259    1260    1255    1509    1515    +704
+704    1510    1504                                    99.5
CQUAD8  705     705     1255    1260    1261    1256    1510    1516    +705
+705    1511    1505                                    99.5
CQUAD8  707     707     1257    1262    1263    1258    1518    1523    +707
+707    1519    1513                                    99.5
CQUAD8  708     708     1258    1263    1264    1259    1519    1524    +708
+708    1520    1514                                    99.5
CQUAD8  709     709     1259    1264    1265    1260    1520    1525    +709
+709    1521    1515                                    99.5
CQUAD8  710     710     1260    1265    1266    1261    1521    1526    +710
+710    1522    1516                                    99.5
CQUAD8  1701    701     2257    2252    2251    2233    2507    2501    +1701
+1701   2506    2512                                    99.5
CQUAD8  1702    702     2252    2257    2258    2253    2507    2513    +1702
+1702   2508    2502                                    99.5
CQUAD8  1703    703     2253    2258    2259    2254    2508    2514    +1703
+1703   2509    2503                                    99.5
CQUAD8  1704    704     2254    2259    2260    2255    2509    2515    +1704
+1704   2510    2504                                    99.5
CQUAD8  1705    705     2255    2260    2261    2256    2510    2516    +1705
+1705   2511    2505                                    99.5
CQUAD8  1707    707     2257    2262    2263    2258    2518    2523    +1707
+1707   2519    2513                                    99.5
CQUAD8  1708    708     2258    2263    2264    2259    2519    2524    +1708
+1708   2520    2514                                    99.5
CQUAD8  1709    709     2259    2264    2265    2260    2520    2525    +1709
+1709   2521    2515                                    99.5
CQUAD8  1710    710     2260    2265    2266    2261    2521    2526    +1710
+1710   2522    2516                                    99.5
CSHEAR  71      71      1034    1040    1037    1031
CSHEAR  72      72      1040    1048    1045    1037
CSHEAR  73      73      1048    1057    1054    1045
CSHEAR  74      74      1057    1069    1066    1054
CSHEAR  75      75      1069    1082    1121    1066
CSHEAR  76      76      1094    1079    1114    1121
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CSHEAR  77      71      2034    2040    2037    2031
CSHEAR  78      72      2040    2048    2045    2037
CSHEAR  79      73      2048    2057    2054    2045
CSHEAR  80      74      2057    2069    2066    2054
CSHEAR  81      75      2069    2082    2121    2066
CSHEAR  82      76      2094    2079    2114    2121
CSHEAR  201     201     1465    1464    1466    1467
CSHEAR  202     202     1275    1276    1464    1465
CSHEAR  203     203     1280    1290    1276    1275
CSHEAR  204     204     1114    1079    1293    1292
CSHEAR  205     201     2465    2464    2466    2467
CSHEAR  206     202     2275    2276    2464    2465
CSHEAR  207     203     2280    2290    2276    2275
CSHEAR  208     204     2114    2079    2293    2292
CSHEAR  642     642     1075    1088    1087    1074
CSHEAR  646     646     1074    1087    1086    1073
CSHEAR  650     650     1073    1086    1085    1072
CSHEAR  651     651     1007    1018    1016    1006
CSHEAR  652     652     1006    1016    1180    1176
CSHEAR  653     653     1176    1180    1014    1005
CSHEAR  654     654     1005    1014    1179    1175
CSHEAR  655     655     1175    1179    1012    1004
CSHEAR  656     656     1004    1012    1178    1174
CSHEAR  657     657     1174    1178    1010    1003
CSHEAR  658     658     1003    1010    1177    1173
CSHEAR  659     659     1173    1177    1194    1002
CSHEAR  660     660     1002    1194    1008    1001
CSHEAR  1642    642     2075    2088    2087    2074
CSHEAR  1646    646     2074    2087    2086    2073
CSHEAR  1650    650     2073    2086    2085    2072
CSHEAR  1651    651     2007    2018    2016    2006
CSHEAR  1652    652     2006    2016    2180    2176
CSHEAR  1653    653     2176    2180    2014    2005
CSHEAR  1654    654     2005    2014    2179    2175
CSHEAR  1655    655     2175    2179    2012    2004
CSHEAR  1656    656     2004    2012    2178    2174
CSHEAR  1657    657     2174    2178    2010    2003
CSHEAR  1658    658     2003    2010    2177    2173
CSHEAR  1659    659     2173    2177    2194    2002
CSHEAR  1660    660     2002    2194    2008    2001
CTRIA3  606     606     1032    1038    1030
CTRIA3  612     612     1181    1182    1029
CTRIA3  617     617     1029    1044    1027
CTRIA3  622     622     1187    1188    1026
CTRIA3  626     626     1026    1052    1025
CTRIA3  629     629     1064    1245    1063
CTRIA3  630     630     1064    1077    1245
CTRIA3  631     631     1077    1076    1245
CTRIA3  636     636     1051    1023    1024
CTRIA3  637     637     1051    1022    1023
CTRIA3  638     638     1062    1022    1051
CTRIA3  647     647     1019    1020    1060
CTRIA3  1606    606     2032    2038    2030
CTRIA3  1612    612     2181    2182    2029
CTRIA3  1617    617     2029    2044    2027
CTRIA3  1622    622     2187    2188    2026
CTRIA3  1626    626     2026    2052    2025
CTRIA3  1629    629     2064    2245    2063
CTRIA3  1630    630     2064    2077    2245
CTRIA3  1631    631     2077    2076    2245
CTRIA3  1636    636     2051    2023    2024
CTRIA3  1637    637     2051    2022    2023
CTRIA3  1638    638     2062    2022    2051
CTRIA3  1647    647     2019    2020    2060
CTRIA6  706     706     1262    1257    1233    1518    1512    1517    +706
+706    99.5
CTRIA6  1706    706     2262    2257    2233    2518    2512    2517    +1706
+1706   99.5
DMIG    VTAIL   0       6       1       0
DMIG    *VTAIL          357             1                               *9001
*9001   357             1               0.127440E+06
DMIG    *VTAIL          358             1                               *9002
*9002   357             1               -.217072E+05                    *9003
*9003   358             1               0.680871E+05
DMIG    *VTAIL          359             1                               *9004
*9004   357             1               0.352175E+03                    *9005
*9005   358             1               -.193333E+05                    *9006
*9006   359             1               0.717224E+05
DMIG    *VTAIL          360             1                               *9007
*9007   357             1               0.456481E+03                    *9008
*9008   358             1               -.301624E+03                    *9009
*9009   359             1               -.903472E+04                    *9010
*9010   360             1               0.507642E+05
DMIG    *VTAIL          361             1                               *9011
*9011   357             1               -.131707E+02                    *9012
*9012   358             1               0.315215E+03                    *9013
*9013   359             1               -.103102E+04                    *9014
*9014   360             1               -.504458E+04                    *9015
*9015   361             1               0.468148E+05
DMIG    *VTAIL          362             1                               *9016
*9016   357             1               0.739752E+00                    *9017
*9017   358             1               -.313943E+02                    *9018
*9018   359             1               0.841453E+02                    *9019
*9019   360             1               0.764191E+02                    *9020
*9020   361             1               -.117072E+05                    *9021
*9021   362             1               0.484915E+05
DMIG    *VTAIL          363             1                               *9022
*9022   357             1               0.363626E+00                    *9023
*9023   358             1               -.206621E+01                    *9024
*9024   359             1               0.170371E+02                    *9025
*9025   360             1               -.128679E+03                    *9026
*9026   361             1               0.142936E+04                    *9027
*9027   362             1               -.141053E+05                    *9028
*9028   363             1               0.334950E+05
DMIG    *VTAIL          364             1                               *9029
*9029   357             1               -.178665E+00                    *9030
*9030   358             1               0.286879E+01                    *9031
*9031   359             1               -.179730E+02                    *9032
*9032   360             1               0.822153E+02                    *9033
*9033   361             1               -.308830E+03                    *9034
*9034   362             1               0.163581E+04                    *9035
*9035   363             1               -.934300E+04                    *9036
*9036   364             1               0.133364E+05
DMIG    *VTAIL          367             1                               *9037
*9037   357             1               0.156429E+04                    *9038
*9038   358             1               -.126722E+05                    *9039
*9039   359             1               -.249630E+02                    *9040
*9040   360             1               0.252357E+03                    *9041
*9041   361             1               0.220342E+02                    *9042
*9042   362             1               -.348368E+01                    *9043
*9043   363             1               0.213553E-02                    *9044
*9044   364             1               0.287588E+00                    *9045
*9045   367             1               0.573159E+05
DMIG    *VTAIL          368             1                               *9046
*9046   357             1               0.150006E+03                    *9047
*9047   358             1               -.349447E+04                    *9048
*9048   359             1               -.184666E+05                    *9049
*9049   360             1               -.597411E+03                    *9050
*9050   361             1               0.413201E+03                    *9051
*9051   362             1               -.489800E+02                    *9052
*9052   363             1               -.271009E+00                    *9053
*9053   364             1               -.202789E+01                    *9054
*9054   367             1               -.502776E+04                    *9055
*9055   368             1               0.246725E+05
DMIG    *VTAIL          369             1                               *9056
*9056   357             1               0.292477E+03                    *9057
*9057   358             1               0.106678E+04                    *9058
*9058   359             1               -.372974E+04                    *9059
*9059   360             1               -.163066E+05                    *9060
*9060   361             1               -.720338E+03                    *9061
*9061   362             1               0.400484E+03                    *9062
*9062   363             1               0.516836E+00                    *9063
*9063   364             1               -.141972E+02                    *9064
*9064   367             1               0.245134E+03                    *9065
*9065   368             1               -.625047E+04                    *9066
*9066   369             1               0.208907E+05
DMIG    *VTAIL          370             1                               *9067
*9067   357             1               0.109520E+02                    *9068
*9068   358             1               -.429165E+02                    *9069
*9069   359             1               0.371999E+03                    *9070
*9070   360             1               -.238343E+04                    *9071
*9071   361             1               -.147446E+05                    *9072
*9072   362             1               0.690143E+03                    *9073
*9073   363             1               0.723676E+03                    *9074
*9074   364             1               0.244021E+02                    *9075
*9075   367             1               -.574195E+02                    *9076
*9076   368             1               0.416297E+03                    *9077
*9077   369             1               -.416404E+04                    *9078
*9078   370             1               0.182966E+05
DMIG    *VTAIL          371             1                               *9079
*9079   357             1               -.319898E+00                    *9080
*9080   358             1               -.105520E+02                    *9081
*9081   359             1               0.537074E+02                    *9082
*9082   360             1               0.115046E+03                    *9083
*9083   361             1               -.455381E+03                    *9084
*9084   362             1               -.131301E+05                    *9085
*9085   363             1               0.208463E+04                    *9086
*9086   364             1               -.271085E+03                    *9087
*9087   367             1               0.123231E+02                    *9088
*9088   368             1               -.234544E+03                    *9089
*9089   369             1               0.874696E+03                    *9090
*9090   370             1               -.744486E+04                    *9091
*9091   371             1               0.300624E+05
DMIG    *VTAIL          372             1                               *9092
*9092   357             1               0.463602E+00                    *9093
*9093   358             1               -.677371E+01                    *9094
*9094   359             1               -.134083E+02                    *9095
*9095   360             1               0.577641E+02                    *9096
*9096   361             1               0.669330E+02                    *9097
*9097   362             1               -.915742E+03                    *9098
*9098   363             1               -.544593E+04                    *9099
*9099   364             1               0.116824E+04                    *9100
*9100   367             1               -.794538E+01                    *9101
*9101   368             1               0.789193E+02                    *9102
*9102   369             1               -.316023E+03                    *9103
*9103   370             1               0.187626E+04                    *9104
*9104   371             1               -.192798E+05                    *9105
*9105   372             1               0.276338E+05
DMIG    *VTAIL          373             1                               *9106
*9106   357             1               0.484957E-02                    *9107
*9107   358             1               0.440965E+00                    *9108
*9108   359             1               -.691597E+00                    *9109
*9109   360             1               -.875753E+00                    *9110
*9110   361             1               0.363362E+02                    *9111
*9111   362             1               0.411035E+01                    *9112
*9112   363             1               -.163347E+04                    *9113
*9113   364             1               -.258823E+04                    *9114
*9114   367             1               0.345739E+00                    *9115
*9115   368             1               -.422117E+01                    *9116
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*9117   370             1               -.633944E+02                    *9118
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*9119   372             1               -.730833E+04                    *9120
*9120   373             1               0.703131E+04
DMIG    *VTAIL          375             1                               *9121
*9121   357             1               -.230046E+04                    *9122
*9122   358             1               -.497159E+05                    *9123
*9123   359             1               0.157355E+04                    *9124
*9124   360             1               0.126726E+04                    *9125
*9125   361             1               0.195618E+03                    *9126
*9126   362             1               -.247898E+02                    *9127
*9127   363             1               0.635440E+01                    *9128
*9128   364             1               -.784751E+00                    *9129
*9129   367             1               0.378804E+03                    *9130
*9130   368             1               -.142639E+04                    *9131
*9131   369             1               0.123205E+04                    *9132
*9132   370             1               0.216183E+03                    *9133
*9133   371             1               -.467290E+02                    *9134
*9134   372             1               0.428324E+01                    *9135
*9135   373             1               -.914807E+00                    *9136
*9136   375             1               0.925573E+06
DMIG    *VTAIL          376             1                               *9137
*9137   357             1               0.922286E+03                    *9138
*9138   358             1               0.349061E+04                    *9139
*9139   359             1               -.272521E+05                    *9140
*9140   360             1               0.153243E+04                    *9141
*9141   361             1               0.667605E+03                    *9142
*9142   362             1               -.740884E+01                    *9143
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*9144	364	1	0.583973E+00	*9145
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*9146	368	1	0.129929E+04	*9147
*9147	369	1	0.235053E+04	*9148
*9148	370	1	0.756407E+03	*9149
*9149	371	1	0.771059E+02	*9150
*9150	372	1	-.600606E+00	*9151
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*9152	375	1	-.311505E+05	*9153
*9153	376	1	0.109246E+06	
DMIG	*VTAIL	377	1	*9154
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*9160	363	1	0.811533E+02	*9161
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+9459	383	1	-.168094E-05	+9460
+9460	384	1	-.237751E+04	+9461
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+9462	386	1	0.147890E+03	+9463
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+9481	390	1	0.120338E+03	+9482
+9482	391	1	-.161773E+04	+9483
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DMIG	+VTAIL	393	1	+9484
+9484	387	1	0.571031E+03	+9485
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+9489	392	1	-.482110E+03	+9490
+9490	393	1	0.521340E+03	
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+9493	359	1	0.964342E+04	+9494
+9494	360	1	0.204728E+04	+9495
+9495	361	1	0.398450E+03	+9496
+9496	362	1	-.464190E+02	+9497
+9497	363	1	0.243519E+01	+9498
+9498	364	1	0.188718E+01	+9499
+9499	367	1	-.763702E+03	+9500
+9500	368	1	0.453518E+04	+9501
+9501	369	1	0.344413E+04	+9502
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+9504	372	1	0.407663E+01	+9505
+9505	373	1	0.500855E+00	+9506
+9506	375	1	-.443406E+06	+9507
+9507	376	1	0.504302E+05	+9508
+9508	377	1	0.246556E+04	+9509
+9509	378	1	-.456917E+02	+9510
+9510	379	1	-.386113E+02	+9511
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+9515	384	1	-.968350E+06	+9516
+9516	385	1	0.197004E+04	+9517
+9517	386	1	-.358031E+03	+9518
+9518	387	1	0.100278E+03	+9519
+9519	388	1	-.101088E+02	+9520
+9520	389	1	-.305457E+04	+9521
+9521	406	1	0.176490E+07	
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+9554	357	1	-.911903E+05	+9555
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+9556	359	1	0.231467E+03	+9557
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+9586	407	1	0.122983E+06	
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+9525	360	1	-.160270E+04	+9526
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+EIG1   MAX
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GRID    8       5         -141.0943.076  .000     0
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GRID    10      5         -100.7503.353  .000     0
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MAT1    2       10.5E6  4.0E6
MAT1    3       .99999E8.99999E8
MAT1    4       10.5E6  .99999E8
MAT1    5       10.5E6  4.400E6
MAT1    601     3.150E6 4.400E6
MAT1    606     6.825E6 4.400E6
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PBEAM   31      2       200.000 9999.0  99999.00        .01             +31
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PBEAM   32      2       200.000 9999.0  99999.00        .01             +32
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+33     NO      1.0     207.000
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+34     NO      1.0     215.000
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+36     NO      1.0     222.000
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+37     NO      1.0     1188.000
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+38     NO      1.0     .950            49.35
PBEAM   39      2       4.140   9999.0  323.80                          +39
+39     NO      1.0     2.140           123.20
PBEAM   40      2       4.140   9999.0  284.10                          +40
+40     NO      1.0     2.180           140.90
PBEAM   41      2       5.590   9999.0  376.40                          +41
+41     NO      1.0     2.834           124.70
PBEAM   42      2       3.942   9999.0  379.30                          +42
+42     NO      1.0     2.088           112.40
PBEAM   43      2       2.886   9999.0  350.15                          +43
+43     NO      1.0     2.340           293.75
PBEAM   44      2       2.340   9999.0  293.75                          +44
+44     NO      1.0     1.430           99.875
PBEAM   45      2       1.430   9999.0  99.875          .001            +45
+45     NO      1.0     1.521           76.375
PBEAM   46      2       2.250   9999.0  215.00          .001            +46
+46     NO      1.0     2.250           162.00
PBEAM   47      2       2.250   9999.0  162.00                          +47
+47     NO      1.0     1.875           133.00
PBEAM   48      2       1.875   9999.0  133.00                          +48
+48     NO      1.0     2.250           46.00
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+57     NO      1.0     1.440                                           +57A
+57A    0.      1.              .0000
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+141    NO      1.0     2.520           52.89                           +141A
+141A   0.      1.              -.0571
PBEAM   142     2       2.520   1.      52.89           .001            +142
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+143    NO      1.0     2.800           61.49                           +143A
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PBEAM   147     2       1.017   1.      34.25           .001            +147
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PBEAM   148     2       1.500   1.      24.08           .001            +148
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+154    NO      1.0     18.000          130.90                          +154A
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PBEAM   169     2       4.200   1.      20.00           .001            +169
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PBEAM   173     2       1.125   1.      41.92           .001            +173
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+1002   NO      1.      1.23648         13.640                          +1002A
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PBEAM   1016    2       1.0098  1.      36.787                          +1016
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+1084A	0.	1.		.145			
PBEAM	1085	2	0.48768	1.	2.242		+1085
+1085	NO	1.	0.39912		2.251		+1085A
+1085A	0.	1.		.200			
PBEAM	1086	2	0.73172	1.	4.425		+1086
+1086	NO	1.	0.7194		4.277		+1086A
+1086A	0.	1.		1.70-2			
PBEAM	1087	2	0.7194	1.	4.277		+1087
+1087	NO	1.	0.66748		3.682		+1087A
+1087A	0.	1.		7.49-2			
PBEAM	1088	2	0.48544	1.	3.682		+1088
+1088	NO	1.	0.448		3.136		+1088A
+1088A	0.	1.		8.02-2			
PBEAM	1089	2	0.616	1.	3.136		+1089
+1089	NO	1.	0.59752		2.951		+1089A
+1089A	0.	1.		3.05-2			
PBEAM	1090	2	0.59752	1.	3.319		+1090
+1090	NO	1.	0.56496		2.968		+1090A
+1090A	0.	1.		5.60-2			
PBEAM	1091	2	.964044	1.	26.163		+1091
+1091	NO	1.	.900046		33.946		+1091A
+1091A	0.	1.		6.87-2			
PBEAM	1092	2	.80058	1.	8.240		+1092
+1092	NO	1.	.740025		7.040		+1092A
+1092A	0.	1.		7.86-2			
PBEAM	1093	2	0.9867	1.	3.017		+1093
+1093	NO	1.	0.9295		2.678		+1093A
+1093A	0.	1.		5.97-2			
PBEAM	1094	2	0.7605	1.	2.231		+1094
+1094	NO	1.	0.70344		1.909		+1094A
+1094A	0.	1.		7.80-2			
PBEAM	1095	2	0.62528	1.	2.245		+1095
+1095	NO	1.	0.56416		5.554		+1095A
+1095A	0.	1.		.103			
PBEAM	1096	2	1.12832	1.	3.720		+1096
+1096	NO	1.	1.03488		3.138		+1096A
+1096A	0.	1.		8.64-2			
PBEAM	1097	2	0.58212	1.	.9936		+1097
+1097	NO	1.	0.52038		.794		+1097A
+1097A	0.	1.		.112			
PBEAM	1098	2	0.46256	1.	.878		+1098
+1098	NO	1.	0.41088		.692		+1098A
+1098A	0.	1.		.118			
PBEAM	1099	2	0.56496	1.	2.968		+1099

+1099	NO	1.	0.50864		3.405		+1099A
+1099A	0.	1.		.105			
PBEAM	1100	2	0.32368	1.	2.951		+1100
+1100	NO	1.	0.2702		1.360		+1100A
+1100A	0.	1.		.180			
PBEAM	1101	2	0.2895	1.	1.434		+1101
+1101	NO	1.	0.237		1.561		+1101A
+1101A	0.	1.		.199			
PBEAM	1102	2	.803494	1.	19.105		+1102
+1102	NO	1.	.756148		18.318		+1102A
+1102A	0.	1.		6.07-2			
PBEAM	1103	2	.868368	1.	3.7		+1103
+1103	NO	1.	.808308		3.656		+1103A
+1103A	0.	1.		7.16-2			
PBEAM	1104	2	0.56848	1.	7.616		+1104
+1104	NO	1.	0.53648		2.977		+1104A
+1104A	0.	1.		5.79-2			
PBEAM	1105	2	0.53648	1.	1.985		+1105
+1105	NO	1.	0.49888		2.015		+1105A
+1105A	0.	1.		7.26-2			
PBEAM	1106	2	0.49888	1.	2.217		+1106
+1106	NO	1.	0.4536		2.014		+1106A
+1106A	0.	1.		9.51-2			
PBEAM	1107	2	0.70875	1.	2.009		+1107
+1107	NO	1.	0.664		1.764		+1107A
+1107A	0.	1.		6.52-2			
PBEAM	1108	2	0.3984	1.	.670		+1108
+1108	NO	1.	0.37695		.600		+1108A
+1108A	0.	1.		5.53-2			
PBEAM	1109	2	0.37695	1.	.600		+1109
+1109	NO	1.	0.3324		1.367		+1109A
+1109A	0.	1.		.126			
PBEAM	1110	2	0.35456	1.	1.367		+1110
+1110	NO	1.	0.31472		.368		+1110A
+1110A	0.	1.		.119			
PBEAM	1111	2	0.15736	1.	.242		+1111
+1111	NO	1.	0.1264		1.156		+1111A
+1111A	0.	1.		.218			
PBEAM	1112	2	0.1728	1.	.303		+1112
+1112	NO	1.	0.16064		.262		+1112A
+1112A	0.	1.		7.29-2			
PBEAM	1113	2	0.16064	1.	.222		+1113
+1113	NO	1.	0.13784		.163		+1113A
+1113A	0.	1.		.153			
PBEAM	1114	2	0.13784	1.	.148		+1114
+1114	NO	1.	0.12232		.117		+1114A
+1114A	0.	1.		.119			
PBEAM	1115	2	0.12232	1.	.117		+1115
+1115	NO	1.	0.108		.991		+1115A
+1115A	0.	1.		.124			
PBEAM	1116	2	.337714	1.	19.909		+1116
+1116	NO	1.	.312716		19.868		+1116A
+1116A	0.	1.		7.69-2			
PBEAM	1117	2	0.85918	1.	3.590		+1117
+1117	NO	1.	0.77384		3.626		+1117A
+1117A	0.	1.		.105			
PBEAM	1118	2	0.54624	1.	6.20		+1118
+1118	NO	1.	0.49872		2.937		+1118A
+1118A	0.	1.		9.10-2			
PBEAM	1119	2	0.39482	1.	1.371		+1119
+1119	NO	1.	0.35112		1.197		+1119A
+1119A	0.	1.		.117			
PBEAM	1120	2	0.31416	1.	1.796		+1120
+1120	NO	1.	0.27047		1.622		+1120A
+1120A	0.	1.		.149			
PBEAM	1121	2	0.36593	1.	.570		+1121
+1121	NO	1.	0.32453		.448		+1121A
+1121A	0.	1.		.120			
PBEAM	1122	2	0.23987	1.	.388		+1122
+1122	NO	1.	0.2193		.324		+1122A
+1122A	0.	1.		8.96-2			
PBEAM	1123	2	2.193	1.	0.577		+1123
+1123	NO	1.	1.7255		0.319		+1123A
+1123A	0.	1.		.239			
PBEAM	1124	2	1.7255	.1	0.319		+1124
+1124	NO	1.	1.411		0.186		+1124A
+1124A	0.	1.		.201			
PBEAM	1125	2	1.411	1.	0.186		+1125
+1125	NO	1.	1.122		0.37		+1125A
+1125A	0.	1.		.228			
PBEAM	1126	2	0.290	1.	.15		+1126
+1126	NO	1.	0.230				+1126A
+1126A	0.	1.		.231			
PBEAM	1127	2	0.230	1.	.15		+1127
+1127	NO	1.	0.180				+1127A
+1127A	0.	1.		.244			
PBEAM	1128	2	0.180	1.	.15		+1128
+1128	NO	1.	0.150				+1128A
+1128A	0.	1.		.182			
PBEAM	1131	2	24.900	1.	2.334		+1131
+1131	NO	1.0	41.600		4.497		+1131A
+1131A	0.	1.		-.502			
PBEAM	1132	2	22.300	1.	1.258		+1132
+1132	NO	1.0	43.800		6.091		+1132A
+1132A	0.	1.		-.651			
PBEAM	1133	2	43.800	1.	6.091	.001	+1133
+1133	NO	1.0	46.400		8.843		+1133A
+1133A	0.	1.		-.058			
PBEAM	1134	2	46.4	100.	13.5	10.	+1134
+1134	NO	1.	50.68				+1134A
+1134A	0.	1.		-8.82-2			
PBEAM	1135	2	20.300	1.	1.601		+1135
+1135	NO	1.0	39.600		5.214		+1135A
+1135A	0.	1.		-.644			
PBEAM	1136	2	17.900	1.	1.469		+1136
+1136	NO	1.0	35.300		4.849		+1136A
+1136A	0.	1.		-.654			
PBEAM	1137	2	35.300	1.	4.849	.001	+1137
+1137	NO	1.0	39.910		7.360		+1137A
+1137A	0.	1.		-.123			
PBEAM	1138	2	39.91	100.	10.5	10.	+1138
+1138	NO	1.	40.37				+1138A
+1138A	0.	1.		-1.15-2			
PBEAM	1139	2	15.900	1.	1.286		+1139

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+1139   NO      1.0     31.800          4.283                                   +1139A
+1139A  0.      1.              -.667
PBEAM   1140    2       14.000  1.      .836                                    +1140
+1140   NO      1.0     28.200          2.827                                   +1140A
+1140A  0.      1.              -.673
PBEAM   1141    2       28.200  1.      2.827           .001                    +1141
+1141   NO      1.0     32.160          4.634                                   +1141A
+1141A  0.      1.              -.131
PBEAM   1142    2       32.16   100.    7.94            10.                     +1142
+1142   NO      1.      32.70                                                   +1142A
+1142A  0.      1.              -1.67-2
PBEAM   1143    2       12.800  1.      .537                                    +1143
+1143   NO      1.0     26.050          1.860                                   +1143A
+1143A  0.      1.              -.682
PBEAM   1144    2       11.190  1.      .541                                    +1144
+1144   NO      1.0     23.000          1.894                                   +1144A
+1144A  0.      1.              -.691
PBEAM   1145    2       23.000  1.      1.894           .001                    +1145
+1145   NO      1.0     25.560          3.414                                   +1145A
+1145A  0.      1.              -.105
PBEAM   1146    2       25.56   100.    6.5             10.                     +1146
+1146   NO      1.      27.16                                                   +1146A
+1146A  0.      1.              -6.070-2
PBEAM   1147    2       9.060   1.      .492                                    +1147
+1147   NO      1.0     19.800          1.700                                   +1147A
+1147A  0.      1.              -.744
PBEAM   1148    2       7.640   1.      .210                                    +1148
+1148   NO      1.0     17.500          .929                                    +1148A
+1148A  0.      1.              -.784
PBEAM   1149    2       17.500  1.      .929            .001                    +1149
+1149   NO      1.0     18.620          1.942                                   +1149A
+1149A  0.      1.              -.062
PBEAM   1150    2       18.62   100.    4.32            10.                     +1150
+1150   NO      1.      19.3                                                    +1150A
+1150A  0.      1.              -3.59-2
PBEAM   1151    2       7.100   1.      .042                                    +1151
+1151   NO      1.0     16.900          .269                                    +1151A
+1151A  0.      1.              -.817
PBEAM   1152    2       22.300  1.      1.150                                   +1152
+1152   NO      1.0     24.900          1.440                                   +1152A
+1152A  0.      1.              -.110
PBEAM   1153    2       20.300  1.      .870                                    +1153
+1153   NO      1.0     22.300          1.150                                   +1153A
+1153A  0.      1.              -.094
PBEAM   1154    2       17.900  1.      .630                                    +1154
+1154   NO      1.0     20.300          .870                                    +1154A
+1154A  0.      1.              -.126
PBEAM   1155    2       15.900  1.      .470                                    +1155
+1155   NO      1.0     17.900          .630                                    +1155A
+1155A  0.      1.              -.118
PBEAM   1156    2       14.000  1.      .340                                    +1156
+1156   NO      1.0     15.900          .470                                    +1156A
+1156A  0.      1.              -.127
PBEAM   1157    2       12.800  1.      .260                                    +1157
+1157   NO      1.0     14.000          .340                                    +1157A
+1157A  0.      1.              -.090
PBEAM   1158    2       11.190  1.      .280                                    +1158
+1158   NO      1.0     12.800          .260                                    +1158A
+1158A  0.      1.              -.134
PBEAM   1159    2       9.060   1.      .260                                    +1159
+1159   NO      1.0     11.190          .280                                    +1159A
+1159A  0.      1.              -.210
PBEAM   1160    2       7.640   1.      .170                                    +1160
+1160   NO      1.0     9.060           .260                                    +1160A
+1160A  0.      1.              -.170
PBEAM   1161    2       7.100   1.      .120                                    +1161
+1161   NO      1.0     7.640           .170                                    +1161A
+1161A  0.      1.              -.073
PBEAM   1162    2       43.800  1.      5.189                                   +1162
+1162   NO      1.0     41.600          5.636                                   +1162A
+1162A  0.      1.              .052
PBEAM   1163    2       39.600  1.      4.049                                   +1163
+1163   NO      1.0     43.800          5.170                                   +1163A
+1163A  0.      1.              -.101
PBEAM   1164    2       35.300  1.      3.053                                   +1164
+1164   NO      1.0     39.600          4.049                                   +1164A
+1164A  0.      1.              -.115
PBEAM   1165    2       31.800  1.      2.364                                   +1165
+1165   NO      1.0     35.300          3.040                                   +1165A
+1165A  0.      1.              -.104
PBEAM   1166    2       28.200  1.      1.762                                   +1166
+1166   NO      1.0     31.800          2.354                                   +1166A
+1166A  0.      1.              -.120
PBEAM   1167    2       26.050  1.      1.444                                   +1167
+1167   NO      1.0     28.200          1.754                                   +1167A
+1167A  0.      1.              -.079
PBEAM   1168    2       23.000  1.      1.274                                   +1168
+1168   NO      1.0     26.050          1.431                                   +1168A
+1168A  0.      1.              -.124
PBEAM   1169    2       19.800  1.      1.019                                   +1169
+1169   NO      1.0     23.000          1.269                                   +1169A
+1169A  0.      1.              -.150
PBEAM   1170    2       17.500  1.      .706                                    +1170
+1170   NO      1.0     19.800          1.007                                   +1170A
+1170A  0.      1.              -.123
PBEAM   1171    2       16.900  1.      .588                                    +1171
+1171   NO      1.0     17.500          .709                                    +1171A
+1171A  0.      1.              -.035
PBEAM   1181    2       0.341   100.    4.328           .001                    +1181
+1181   NO      1.      1.0025          10.953                                  +1181A
+1181A  0.      1.              -.984
PBEAM   1182    2       1.604   1.      75.00000        .265                    +1182
+1182   NO      1.0     1.365           70.00000                                +1182A
+1182A  0.      1.              .1611
PBEAM   1183    2       68.240  1.      70.00000        .265                    +1183
+1183   NO      1.0     53.180          18.30000                                +1183A
+1183A  0.      1.              .2481
PBEAM   1184    2       1.064   1.      18.30000        .265                    +1184
+1184   NO      1.0     .715            5.30000                                 +1184A
+1184A  0.      1.              .3923
PBEAM   1185    2       .715    1.      5.30000         .265                    +1185
+1185   NO      1.0     .370            .65000                                  +1185A
+1185A  0.      1.              .6362
PBEAM   1186    2       22.130  1.      7.00000         .265                    +1186
+1186   NO      1.0     21.000          7.00000                                 +1186A
+1186A  0.      1.              .0524
PBEAM   1187    2       21.000  1.      7.00000         .265                    +1187
+1187   NO      1.0     16.200          .95000                                  +1187A
+1187A  0.      1.              .2581
PBEAM   1188    2       16.200  1.      .95000          .265                    +1188
+1188   NO      1.0     10.900          .30000                                  +1188A
+1188A  0.      1.              .3911
PBEAM   1189    2       10.900  1.      .30000          .265                    +1189
+1189   NO      1.0     5.690           .04000                                  +1189A
+1189A  0.      1.              .6281
PBEAM   1190    2       3.414   100.    1.1             .001                    +1190
+1190   NO      1.      2.802           1.0                                     +1190A
+1190A  0.      1.              .197
PBEAM   1191    2       18.680  1.      5.80000         .265                    +1191
+1191   NO      1.0     18.680          5.80000                                 +1191A
+1191A  0.      1.              .0000
PBEAM   1192    2       18.680  1.      5.80000         .265                    +1192
+1192   NO      1.0     14.740          .28300                                  +1192A
+1192A  0.      1.              .2358
PBEAM   1193    2       14.740  1.      .28300          .265                    +1193
+1193   NO      1.0     9.990           .09600                                  +1193A
+1193A  0.      1.              .3841
PBEAM   1194    2       9.990   1.      .09600          .265                    +1194
+1194   NO      1.0     5.250           .01400                                  +1194A
+1194A  0.      1.              .6220
PBEAM   1195    2       35.960  1.      5.14100         .265                    +1195
+1195   NO      1.0     33.740          5.13000                                 +1195A
+1195A  0.      1.              .0637
PBEAM   1196    2       33.740  1.      5.13000         .265                    +1196
+1196   NO      1.0     26.740          .22400                                  +1196A
+1196A  0.      1.              .2315
PBEAM   1197    2       26.740  1.      .22400          .265                    +1197
+1197   NO      1.0     18.100          .07510                                  +1197A
+1197A  0.      1.              .3854
PBEAM   1198    2       18.100  1.      .07510          .265                    +1198
+1198   NO      1.0     9.500           .01143                                  +1198A
+1198A  0.      1.              .6232
PBEAM   1199    2       0.924   100.    0.32            .001                    +1199
+1199   NO      1.      0.7535          0.25                                    +1199A
+1199A  0.      1.              .203
PBEAM   1200    2       15.070  1.      3.20000         .265                    +1200
+1200   NO      1.0     15.070          3.20000                                 +1200A
+1200A  0.      1.              .0000
PBEAM   1201    2       15.070  1.      3.20000         .265                    +1201
+1201   NO      1.0     13.370          .17300                                  +1201A
+1201A  0.      1.              .1195
PBEAM   1202    2       13.370  1.      .17300          .265                    +1202
+1202   NO      1.0     8.120           .05600                                  +1202A
+1202A  0.      1.              .4886
PBEAM   1203    2       8.120   1.      .05600          .265                    +1203
+1203   NO      1.0     4.260           .00880                                  +1203A
+1203A  0.      1.              .6236
PBEAM   1204    2       15.940  1.      2.00000         .265                    +1204
+1204   NO      1.0     13.940          2.00000                                 +1204A
+1204A  0.      1.              .1339
PBEAM   1205    2       13.940  1.      2.00000         .265                    +1205
+1205   NO      1.0     11.130          .10800                                  +1205A
+1205A  0.      1.              .2242
PBEAM   1206    2       11.130  1.      .10800          .265                    +1206
+1206   NO      1.0     7.530           .03700                                  +1206A
+1206A  0.      1.              .3859
PBEAM   1207    2       7.530   1.      .03700          .265                    +1207
+1207   NO      1.0     3.950           .00580                                  +1207A
+1207A  0.      1.              .6237
PBEAM   1208    2       12.820  1.      1.20000         .265                    +1208
+1208   NO      1.0     12.820          1.20000                                 +1208A
+1208A  0.      1.              .0000
PBEAM   1209    2       12.820  1.      1.20000         .265                    +1209
+1209   NO      1.0     10.280          .07100                                  +1209A
+1209A  0.      1.              .2199
PBEAM   1210    2       10.280  1.      .07100          .265                    +1210
+1210   NO      1.0     6.960           .02500                                  +1210A
+1210A  0.      1.              .3852
PBEAM   1211    2       6.960   1.      .02500          .265                    +1211
+1211   NO      1.0     3.640           .00370                                  +1211A
+1211A  0.      1.              .6264
PBEAM   1212    2       0.7055  100.    0.32            .001                    +1212
+1212   NO      1.      0.63            0.25                                    +1212A
+1212A  0.      1.              .113
PBEAM   1213    2       12.600  1.      .70000          .265                    +1213
+1213   NO      1.0     11.690          .70000                                  +1213A
+1213A  0.      1.              .0749
PBEAM   1214    2       11.690  1.      .70000          .265                    +1214
+1214   NO      1.0     9.420           .05530                                  +1214A
+1214A  0.      1.              .2151
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RBAR	1313	20	1020	123456	123
RBAR	1314	20	2020	123456	123
RBAR	1315	21	1021	123456	123
RBAR	1316	21	2021	123456	123
RBAR	1317	22	1022	123456	123
RBAR	1318	22	2022	123456	123
RBAR	1319	23	1023	123456	123
RBAR	1320	23	2023	123456	123
RBAR	1321	24	1024	123456	123
RBAR	1322	24	2024	123456	123
RBAR	1323	25	1025	123456	123
RBAR	1324	25	2025	123456	123
RBAR	1325	26	1026	123456	123
RBAR	1326	26	2026	123456	123
RBAR	1327	27	1027	123456	123
RBAR	1328	27	2027	123456	123
RBAR	1329	29	1029	123456	123
RBAR	1330	29	2029	123456	123
RBAR	1331	30	1030	123456	123
RBAR	1332	30	2030	123456	123
RBAR	1333	32	1032	123456	123
RBAR	1334	32	2032	123456	123
RBAR	1335	33	1033	123456	123
RBAR	1336	33	2033	123456	123
RBAR	1337	38	1038	123456	123
RBAR	1338	38	2038	123456	123
RBAR	1339	39	1039	123456	123
RBAR	1340	39	2039	123456	123
RBAR	1341	44	1044	123456	123
RBAR	1342	44	2044	123456	123
RBAR	1343	46	1046	123456	123
RBAR	1344	46	2046	123456	123
RBAR	1345	47	1047	123456	123
RBAR	1346	47	2047	123456	123
RBAR	1347	51	1051	123456	123
RBAR	1348	51	2051	123456	123
RBAR	1349	52	1052	123456	123
RBAR	1350	52	2052	123456	123
RBAR	1351	53	1053	123456	123
RBAR	1352	53	2053	123456	123
RBAR	1353	55	1055	123456	123
RBAR	1354	55	2055	123456	123
RBAR	1355	56	1056	123456	123
RBAR	1356	56	2056	123456	123
RBAR	1357	60	1060	123456	123
RBAR	1358	60	2060	123456	123
RBAR	1359	61	1061	123456	123
RBAR	1360	61	2061	123456	123
RBAR	1361	62	1062	123456	123
RBAR	1362	62	2062	123456	123
RBAR	1363	63	1063	123456	123
RBAR	1364	63	2063	123456	123
RBAR	1365	64	1064	123456	123
RBAR	1366	64	2064	123456	123
RBAR	1367	65	1065	123456	123
RBAR	1368	65	2065	123456	123
RBAR	1369	67	1067	123456	123
RBAR	1370	67	2067	123456	123
RBAR	1371	68	1068	123456	123

RBAR	1372	68	2068	123456	123
RBAR	1373	72	1072	123456	123
RBAR	1374	72	2072	123456	123
RBAR	1375	73	1073	123456	123
RBAR	1376	73	2073	123456	123
RBAR	1377	74	1074	123456	123
RBAR	1378	74	2074	123456	123
RBAR	1379	75	1075	123456	123
RBAR	1380	75	2075	123456	123
RBAR	1381	76	1076	123456	123
RBAR	1382	76	2076	123456	123
RBAR	1383	77	1077	123456	123
RBAR	1384	77	2077	123456	123
RBAR	1385	78	1078	123456	123
RBAR	1386	78	2078	123456	123
RBAR	1387	80	1080	123456	123
RBAR	1388	80	2080	123456	123
RBAR	1389	81	1081	123456	123
RBAR	1390	81	2081	123456	123
RBAR	1391	85	1085	123456	123
RBAR	1392	85	2085	123456	123
RBAR	1393	86	1086	123456	123
RBAR	1394	86	2086	123456	123
RBAR	1395	87	1087	123456	123
RBAR	1396	87	2087	123456	123
RBAR	1397	88	1088	123456	123
RBAR	1398	88	2088	123456	123
RBAR	1407	143	1143	123456	123
RBAR	1408	143	2143	123456	123
RBAR	1409	181	1181	123456	123
RBAR	1410	181	2181	123456	123
RBAR	1411	182	1182	123456	123
RBAR	1412	182	2182	123456	123
RBAR	1413	183	1183	123456	123
RBAR	1414	183	2183	123456	123
RBAR	1415	184	1184	123456	123
RBAR	1416	184	2184	123456	123
RBAR	1417	185	1185	123456	123
RBAR	1418	185	2185	123456	123
RBAR	1419	186	1186	123456	123
RBAR	1420	186	2186	123456	123
RBAR	1421	187	1187	123456	123
RBAR	1422	187	2187	123456	123
RBAR	1423	188	1188	123456	123
RBAR	1424	188	2188	123456	123
RBAR	1425	189	1189	123456	123
RBAR	1426	189	2189	123456	123
RBAR	1427	190	1190	123456	123
RBAR	1428	190	2190	123456	123
RBAR	1429	191	1191	123456	123
RBAR	1430	191	2191	123456	123
RBAR	1431	192	1192	123456	123
RBAR	1432	192	2192	123456	123
RBAR	1433	193	1193	123456	123
RBAR	1434	193	2193	123456	123
RBAR	1435	242	1242	123456	123
RBAR	1436	242	2242	123456	123
RBAR	1437	243	1243	123456	123
RBAR	1438	243	2243	123456	123
RBAR	1439	244	1244	123456	123
RBAR	1440	244	2244	123456	123
RBAR	1441	245	1245	123456	123
RBAR	1442	245	2245	123456	123
RBAR	1451	1	1001	123456	123
RBAR	1452	1	2001	123456	123
RBAR	1453	2	1002	123456	123
RBAR	1454	2	2002	123456	123
RBAR	1455	3	1003	123456	123
RBAR	1456	3	2003	123456	123
RBAR	1457	4	1004	123456	123
RBAR	1458	4	2004	123456	123
RBAR	1459	5	1005	123456	123
RBAR	1460	5	2005	123456	123
RBAR	1461	6	1006	123456	123
RBAR	1462	6	2006	123456	123
RBAR	1463	7	1007	123456	123
RBAR	1464	7	2007	123456	123
RBAR	1465	8	1008	123456	123
RBAR	1466	8	2008	123456	123
RBAR	1467	10	1010	123456	123
RBAR	1468	10	2010	123456	123
RBAR	1469	12	1012	123456	123
RBAR	1470	12	2012	123456	123
RBAR	1471	14	1014	123456	123
RBAR	1472	14	2014	123456	123
RBAR	1473	16	1016	123456	123
RBAR	1474	16	2016	123456	123
RBAR	1475	18	1018	123456	123
RBAR	1476	18	2018	123456	123
RBAR	1477	173	1173	123456	123
RBAR	1478	173	2173	123456	123
RBAR	1479	174	1174	123456	123
RBAR	1480	174	2174	123456	123
RBAR	1481	175	1175	123456	123
RBAR	1482	175	2175	123456	123
RBAR	1483	176	1176	123456	123
RBAR	1484	176	2176	123456	123
RBAR	1485	177	1177	123456	123
RBAR	1486	177	2177	123456	123
RBAR	1487	178	1178	123456	123
RBAR	1488	178	2178	123456	123
RBAR	1489	179	1179	123456	123
RBAR	1490	179	2179	123456	123
RBAR	1491	180	1180	123456	123
RBAR	1492	180	2180	123456	123
RBAR	1493	194	1194	123456	123
RBAR	1494	194	2194	123456	123
RBAR	1501	96	1096	123456	123
RBAR	1502	96	2096	123456	123
RBAR	1503	97	1097	123456	123
RBAR	1504	97	2097	123456	123
RBAR	1505	98	1098	123456	123
RBAR	1506	98	2098	123456	123
RBAR	1507	99	1099	123456	123
RBAR	1508	99	2099	123456	123
RBAR	1509	100	1100	123456	123
RBAR	1510	100	2100	123456	123
RBAR	1511	101	1101	123456	123
RBAR	1512	101	2101	123456	123
RBAR	1513	102	1102	123456	123
RBAR	1514	102	2102	123456	123
RBAR	1515	103	1103	123456	123
RBAR	1516	103	2103	123456	123
RBAR	1517	104	1104	123456	123
RBAR	1518	104	2104	123456	123
RBAR	1519	105	1105	123456	123
RBAR	1520	105	2105	123456	123
RBAR	1521	106	1106	123456	123
RBAR	1522	106	2106	123456	123
RBAR	1523	107	1107	123456	123
RBAR	1524	107	2107	123456	123
RBAR	1525	108	1108	123456	123
RBAR	1526	108	2108	123456	123
RBAR	1527	109	1109	123456	123
RBAR	1528	109	2109	123456	123
RBAR	1529	110	1110	123456	123
RBAR	1530	110	2110	123456	123
RBAR	1531	111	1111	123456	123
RBAR	1532	111	2111	123456	123
RBAR	1533	112	1112	123456	123
RBAR	1534	112	2112	123456	123
RBAR	1535	113	1113	123456	123
RBAR	1536	113	2113	123456	123
RBAR	1537	125	1125	123456	123
RBAR	1538	125	2125	123456	123
RBAR	1539	126	1126	123456	123
RBAR	1540	126	2126	123456	123
RBAR	1541	127	1127	123456	123
RBAR	1542	127	2127	123456	123
RBAR	1543	128	1128	123456	123
RBAR	1544	128	2128	123456	123
RBAR	1545	129	1129	123456	123
RBAR	1546	129	2129	123456	123
RBAR	1547	130	1130	123456	123
RBAR	1548	130	2130	123456	123
RBAR	1549	131	1131	123456	123
RBAR	1550	131	2131	123456	123
RBAR	1551	132	1132	123456	123
RBAR	1552	132	2132	123456	123
RBAR	1553	133	1133	123456	123
RBAR	1554	133	2133	123456	123
RBAR	1555	134	1134	123456	123
RBAR	1556	134	2134	123456	123
RBAR	1557	135	1135	123456	123
RBAR	1558	135	2135	123456	123
RBAR	1559	136	1136	123456	123
RBAR	1560	136	2136	123456	123
RBAR	1561	137	1137	123456	123
RBAR	1562	137	2137	123456	123
RBAR	1563	138	1138	123456	123
RBAR	1564	138	2138	123456	123
RBAR	1565	139	1139	123456	123
RBAR	1566	139	2139	123456	123
RBAR	1567	140	1140	123456	123
RBAR	1568	140	2140	123456	123
RBAR	1569	141	1141	123456	123
RBAR	1570	141	2141	123456	123
RBAR	1571	142	1142	123456	123
RBAR	1572	142	2142	123456	123
RBAR	2235	501	1501	123456	123
RBAR	2236	501	2501	123456	123
RBAR	2237	502	1502	123456	123
RBAR	2238	502	2502	123456	123
RBAR	2239	503	1503	123456	123
RBAR	2240	503	2503	123456	123
RBAR	2241	504	1504	123456	123
RBAR	2242	504	2504	123456	123
RBAR	2243	505	1505	123456	123
RBAR	2244	505	2505	123456	123
RBAR	2245	506	1506	123456	123
RBAR	2246	506	2506	123456	123
RBAR	2247	507	1507	123456	123
RBAR	2248	507	2507	123456	123
RBAR	2249	508	1508	123456	123
RBAR	2250	508	2508	123456	123
RBAR	2251	509	1509	123456	123
RBAR	2252	509	2509	123456	123
RBAR	2253	510	1510	123456	123
RBAR	2254	510	2510	123456	123
RBAR	2255	511	1511	123456	123
RBAR	2256	511	2511	123456	123
RBAR	2257	512	1512	123456	123
RBAR	2258	512	2512	123456	123
RBAR	2259	513	1513	123456	123
RBAR	2260	513	2513	123456	123
RBAR	2261	514	1514	123456	123
RBAR	2262	514	2514	123456	123
RBAR	2263	515	1515	123456	123
RBAR	2264	515	2515	123456	123
RBAR	2265	516	1516	123456	123
RBAR	2266	516	2516	123456	123
RBAR	2267	517	1517	123456	123
RBAR	2268	517	2517	123456	123
RBAR	2269	518	1518	123456	123
RBAR	2270	518	2518	123456	123
RBAR	2271	519	1519	123456	123
RBAR	2272	519	2519	123456	123
RBAR	2273	520	1520	123456	123
RBAR	2274	520	2520	123456	123
RBAR	2275	521	1521	123456	123
RBAR	2276	521	2521	123456	123
RBAR	2277	522	1522	123456	123
RBAR	2278	522	2522	123456	123
RBAR	2279	523	1523	123456	123
RBAR	2280	523	2523	123456	123
RBAR	2281	524	1524	123456	123
RBAR	2282	524	2524	123456	123
RBAR	2283	525	1525	123456	123

```
RBAR    2284    525     2525    123456                  123
RBAR    2285    526     1526    123456                  123
RBAR    2286    526     2526    123456                  123
RBAR    3042    72      3016    123456
RBAR    3043    3016    143     123456                  123
SPC1    3       1       359     360     361     362     364     367
SPC1    3       1       368     369     370     371     373     381
SPC1    3       1       383     384     385     386     387     389
SPC1    3       1       390     391     392     393     408
SPC1    3       156     36      42      50      437     59      431
SPC1    3       156     71      84      298     286     117     285
SPC1    3       156     163     164     153     154     155     156
SPC1    3       156     267     268     458     459
SPC1    3       156     283     284     282     281     405
SPC1    4       234     36      42      50      437     59      431
SPC1    4       234     71      84      298     286     117     285
SPC1    4       234     163     164     153     154     155     156
SPC1    4       234     267     268     458     459
SPC1    4       234     283     284     282     281     405
SPC1    5       4       3022
SPC1    5       456     251     256     261     262     266
SPC1    5       456     1001    1002    1003    1004    1005    1006
SPC1    5       456     1007    1008    1010    1012    1014    1016
SPC1    5       456     1018    1173    1174    1175    1176    1177
SPC1    5       456     1019    THRU    1027
SPC1    5       456     1029    1030    1032    1033    1038    1039
SPC1    5       456     1031    1034    1037    1040    1045    1048
SPC1    5       456     1044    1046    1047    1051    1052    1053
SPC1    5       456     1054    1057    1066    1069    1079    1082
SPC1    5       456     1055    1056    1060    1061    1062    1063
SPC1    5       456     1064    1065    1067    1068    1072    1073
SPC1    5       456     1074    1075    1076    1077    1078    1080
SPC1    5       456     1079    1114    1275    1276    1280    1290
SPC1    5       456     1081    1085    1086    1087    1088
SPC1    5       456     1094    1114    1121
SPC1    5       456     1096    1097    1098    1099    1100    1101
SPC1    5       456     1102    1103    1104    1105    1106    1107
SPC1    5       456     1108    1109    1110    1111    1112    1113
SPC1    5       456     1125    1126    1127
SPC1    5       456     1128    1129    1130    1131    1132    1133
SPC1    5       456     1134    1135    1136    1137    1138    1139
SPC1    5       456     1140    1141    1142
SPC1    5       456     1143
SPC1    5       456     1178    1179    1180    1194
SPC1    5       456     1181    THRU    1193
SPC1    5       456     1233    2233
SPC1    5       456     1242    1243    1244    1245
SPC1    5       456     1251    THRU    1266
SPC1    5       456     1292    1293    1464    1465    1466    1467
SPC1    5       456     1501    THRU    1526
SPC1    5       456     2001    2002    2003    2004    2005    2006
SPC1    5       456     2007    2008    2010    2012    2014    2016
SPC1    5       456     2018    2173    2174    2175    2176    2177
SPC1    5       456     2019    THRU    2027
SPC1    5       456     2029    2030    2032    2033    2038    2039
SPC1    5       456     2031    2034    2037    2040    2045    2048
SPC1    5       456     2044    2046    2047    2051    2052    2053
SPC1    5       456     2054    2057    2066    2069    2079    2082
SPC1    5       456     2055    2056    2060    2061    2062    2063
SPC1    5       456     2064    2065    2067    2068    2072    2073
SPC1    5       456     2074    2075    2076    2077    2078    2080
SPC1    5       456     2079    2114    2275    2276    2280    2290
SPC1    5       456     2081    2085    2086    2087    2088
SPC1    5       456     2094    2114    2121
SPC1    5       456     2096    2097    2098    2099    2100    2101
SPC1    5       456     2102    2103    2104    2105    2106    2107
SPC1    5       456     2108    2109    2110    2111    2112    2113
SPC1    5       456     2125    2126    2127
SPC1    5       456     2128    2129    2130    2131    2132    2133
SPC1    5       456     2134    2135    2136    2137    2138    2139
SPC1    5       456     2140    2141    2142
SPC1    5       456     2143
SPC1    5       456     2178    2179    2180    2194
SPC1    5       456     2181    THRU    2193
SPC1    5       456     2242    2243    2244    2245
SPC1    5       456     2251    THRU    2266
SPC1    5       456     2292    2293    2464    2465    2466    2467
SPC1    5       456     2501    THRU    2526
SPC1    5       123456  701     702     703
SPCADD  1       3       5
SPCADD  2       4       5
SUPORT  42      156
ENDDATA
```

Appendix B.
Structural Finite Element Data for Typical LCO Case

```
ID LMTAS BLOCK 40 F-16 FLUTTER FEM TYPICAL LCO CASE
SOL 103
TIME 20
$
CEND
$
TITLE=F-16 1/2 AIRPLANE FINITE ELEMENT MODEL FOR FLUTTER ANALYSIS
SUBTI=ANTI-SYMMETRIC CENTERLINE BOUNDARY CONDITIONS // FULL XWING FUEL
LABEL=CONFIG 5 = MA41
DISP=ALL
ECHO=SORT
$ DMIG VERTICAL TAIL STIFFNESS MATRIX
K2GG=VTAIL
$ EIGENVALUE EXTRACTION
METHOD=1
$ SYMMETRIC B.C. / SPC=2 FOR ANTISYMMETRIC
SPC=2
$
$ SET 203022=GRIDS USED IN FLUTTER ANALYSIS.
$ ADD GRIDS 801 THROUGH 814 FOR DYNAMIC RESPONSE.
$
SET 203022=   2,   3,   4,   5,   6,
              9,  11,  13,  15,  17,
             19,  20,  21,  26,  29,
             33,  39,  44,  47,  51,
             52,  53,  56,  60,  61,
             62,  64,  65,  68,  72,
             73,  74,  75,  77,  78,
             81,  85,  86,  87,  89,
             90,  91,  92,  93,  95,
            102, 103, 104, 105, 106,
            107, 108, 109, 110, 111,
            112, 113, 122, 123, 124,
            128, 129, 130, 131, 132,
            133,3004,3006,3009          $ AIM-9/16S200 OR 16S200 ON TIP
$
$ GENERATE BUT DO NOT PRINT-
$  EIGENVECTORS FOR FLUTTER ANALYSIS
$
$ PRINT-
$ A-SET EIGENVECTORS FOR INSPECTION
$
OUTPUT(PLOT)
CSCALE=1.8
PAPER SIZE=26. BY 20.
$
$ SET 10=ELEMENTS USED IN MODE PLOTS
$
$ FUSELAGE CENTERLINE
SET 10=   1 THRU   26,
$ WING BOX
       1001 THRU 1005,
       1007,1010 THRU 1013,
       1020,1023 THRU 1025,
       1031,1034,1036,1043,1045,
       1046,1048 THRU 1054,
       1056 THRU 1062,
       1071 THRU 1074,
       1078,1079,1080,
       1086 THRU 1090,
       1099,1100,1101,
       1075,1076,1077,
       1081 THRU 1085,
       1091 THRU 1097,
       1102 THRU 1111,
       1116 THRU 1125,
       1126,1127,1128,
 $ LEADING EDGE FLAP / 1258 ACTUATOR
       1131 THRU 1134,
       1136,1137,1138,
       1140,1141,1142,
       1144,1145,1146,
       1148 THRU 1151,
       1152 THRU 1171,
 $ FLAPERON
       1181 THRU 1185,
       1187 THRU 1189,
       1190 THRU 1194,
       1196 THRU 1203,
       1205 THRU 1207,
       1209 THRU 1220,
       1231 THRU 1238,
       1251 THRU 1258,
       1261 THRU 1268,
 $ HORIZONTAL TAIL
       2001 THRU 2058,
 $ VERTICAL TAIL
       2401 THRU 2460,
 $ 16S200 // STATION 1,9
       3003 THRU 3009,
 $ AIM-9L // STATION 1,9
       3014,3015
 $
MAXIMUM DEFORMATION 35.
AXES MX,MY,Z
VIEW 60.0,30.,0.
FIND SCALE ORIGIN 10 SET 10
PLOT MODAL DEFO 0 SET 10 ORIGIN 10
$
$
BEGIN BULK
ASET    3500    123456
ASET    3501    123456
```

```
ASET1   1       163     153     154     155     156     71      286
ASET1   1       267
ASET1   1       284     281
ASET1   1       367     408     368     359     384
ASET1   1       373     364     381     383
ASET1   1       386     391     371     362     387     392     393
ASET1   1       389     369     360     385     390     370     361
ASET1   1       410
ASET1   1       3050    3053    3057
ASET1   1       3207    3210    3211    3213
ASET1   2       3049    3054
ASET1   2       3206    3212
ASET1   3       6       17      5       15      4       13      3
ASET1   3       11      2       9
ASET1   3       19      72      20      60      73      21      61
ASET1   3       39      47      56      68      81
ASET1   3       74      51      62      75      26      52      64
ASET1   3       77      29      44      53      65      78      33
ASET1   3       85      86      87      88
ASET1   3       90      103     109     89      102     108
ASET1   3       95      107     113     93      106     112     124
ASET1   3       130     133     92      105     111     123     129
ASET1   3       132     91      104     110     122     128     131
ASET1   3       233
ASET1   3       251     THRU    266
ASET1   3       3017    3019    3022
ASET1   3       3046    3050    3053    3057
ASET1   3       3204    3210    3211    3213
ASET1   4       3204    3211
ASET1   5       153     154     155     156     71      286     284
ASET1   5       410
ASET1   5       459
ASET1   5       3211
ASET1   6       437     281     410
ASET1   6       458
ASET1   6       3207    3211
ASET1   3456    3018
ASET1   123456  3060
CBAR    27      27      284     410     1.      1.      0.
CBAR    2401    2401    407     367     0.      1.      1.
CBAR    2402    2402    367     368     0.      1.      1.
CBAR    2403    2403    368     369     0.      1.      1.
CBAR    2404    2404    369     370     0.      1.      1.
CBAR    2405    2405    370     371     0.      1.      1.
CBAR    2406    2406    371     372     0.      1.      1.
CBAR    2407    2407    372     373     0.      1.      1.
CBAR    2408    2408    357     358     0.      1.      1.
CBAR    2409    2409    358     359     0.      1.      1.
CBAR    2410    2410    359     360     0.      1.      1.
CBAR    2411    2411    360     361     0.      1.      1.
CBAR    2412    2412    361     362     0.      1.      1.
CBAR    2413    2413    362     363     0.      1.      1.
CBAR    2414    2414    363     364     0.      1.      1.
CBAR    2415    2415    409     375     0.      1.      1.
CBAR    2416    2416    375     376     0.      1.      1.
CBAR    2417    2417    376     377     0.      1.      1.
CBAR    2418    2418    377     378     0.      1.      1.
CBAR    2419    2419    378     379     0.      1.      1.
CBAR    2420    2420    379     380     0.      1.      1.
CBAR    2421    2421    380     381     0.      1.      1.
CBAR    2422    2422    382     383     0.      1.      1.
CBAR    2423    2423    384     385     0.      1.      1.
CBAR    2424    2424    385     386     0.      1.      1.
CBAR    2425    2425    386     387     0.      1.      1.
CBAR    2426    2426    387     388     0.      1.      1.
CBAR    2427    2427    389     390     0.      1.      1.
CBAR    2428    2428    390     391     0.      1.      1.
CBAR    2429    2429    391     392     0.      1.      1.
CBAR    2430    2430    392     393     0.      1.      1.
CBAR    2431    2431    407     357     0.      1.      1.
CBAR    2432    2432    357     409     0.      1.      1.
CBAR    2433    2433    367     358     0.      1.      1.
CBAR    2434    2434    358     375     0.      1.      1.
CBAR    2435    2435    375     384     0.      1.      1.
CBAR    2436    2436    375     406     0.      1.      1.
CBAR    2437    2437    406     408     0.      1.      1.
CBAR    2438    2438    368     359     0.      1.      1.
CBAR    2439    2439    359     376     0.      1.      1.
CBAR    2440    2440    376     384     0.      1.      1.
CBAR    2441    2441    369     360     0.      1.      1.
CBAR    2442    2442    360     377     0.      1.      1.
CBAR    2443    2443    377     385     0.      1.      1.
CBAR    2444    2444    370     361     0.      1.      1.
CBAR    2445    2445    361     378     0.      1.      1.
CBAR    2446    2446    378     386     0.      1.      1.
CBAR    2447    2447    371     362     0.      1.      1.
CBAR    2448    2448    362     379     0.      1.      1.
CBAR    2449    2449    372     363     0.      1.      1.
CBAR    2450    2450    363     380     0.      1.      1.
CBAR    2451    2451    380     382     0.      1.      1.
CBAR    2452    2452    380     388     0.      1.      1.
CBAR    2453    2453    373     364     0.      1.      1.
CBAR    2454    2454    364     381     0.      1.      1.
CBAR    2455    2455    381     383     0.      1.      1.
CBAR    2456    2456    384     389     0.      1.      1.
CBAR    2457    2457    385     390     0.      1.      1.
CBAR    2458    2458    386     391     0.      1.      1.
CBAR    2459    2459    387     392     0.      1.      1.
CBAR    2460    2460    388     393     0.      1.      1.
CBAR    3502    3502    3500    52      1.      1.      0.
CBAR    3503    3502    3501    52      1.      1.      0.
CBEAM   1       1       163     164     1.      0.      0.
CBEAM   2       2       164     153     1.      0.      0.
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CBEAM	3	3	267	154	1.	0.	0.	
CBEAM	4	4	154	155	1.	0.	0.	
CBEAM	5	5	155	156	1.	0.	0.	
CBEAM	6	6	268	36	1.	0.	0.	
CBEAM	7	7	36	42	1.	0.	0.	
CBEAM	8	8	42	50	1.	0.	0.	
CBEAM	9	9	50	437	1.	0.	0.	
CBEAM	10	10	437	59	1.	0.	0.	
CBEAM	11	11	59	431	1.	0.	0.	
CBEAM	12	12	431	71	1.	0.	0.	
CBEAM	13	13	71	84	1.	0.	0.	
CBEAM	14	14	84	298	1.	0.	0.	
CBEAM	15	15	298	286	1.	0.	0.	
CBEAM	16	16	286	117	1.	0.	0.	
CBEAM	17	17	117	285	1.	1.	0.	
CBEAM	18	18	285	283	1.	1.	0.	
CBEAM	19	19	283	284	1.	1.	0.	
CBEAM	20	20	284	282	1.	1.	0.	
CBEAM	21	21	282	281	1.	1.	0.	
CBEAM	22	22	281	405	1.	0.	0.	
CBEAM	31	31	36	35	1.	1.	0.	
CBEAM	32	32	42	41	1.	1.	0.	
CBEAM	33	33	50	49	1.	1.	0.	
CBEAM	34	34	59	58	1.	1.	0.	
CBEAM	35	35	71	70	1.	1.	0.	
CBEAM	36	36	84	83	1.	1.	0.	
CBEAM	37	37	117	116	1.	1.	0.	
CBEAM	38	38	34	31	1.	1.	0.	
CBEAM	39	39	40	37	1.	1.	0.	
CBEAM	40	40	48	45	1.	1.	0.	
CBEAM	41	41	57	54	1.	1.	0.	
CBEAM	42	42	69	66	1.	1.	0.	
CBEAM	43	43	82	94	1.	1.	0.	
CBEAM	44	44	94	118	1.	1.	0.	
CBEAM	45	45	118	121	1.	1.	0.	
CBEAM	46	46	115	79	1.	1.	0.	
CBEAM	47	47	79	120	1.	1.	0.	
CBEAM	48	48	120	114	1.	1.	0.	
CBEAM	49	49	31	37	1.	1.	0.	+49BM
+49BM	46							
CBEAM	50	50	37	45	1.	1.	0.	
CBEAM	51	51	45	54	1.	1.	0.	
CBEAM	52	52	54	66	1.	1.	0.	
CBEAM	53	53	66	121	1.	1.	0.	+53BM
+53BM		456						
CBEAM	54	54	121	114	1.	1.	0.	+54BM
+54BM	456							
CBEAM	55	55	118	119	1.	1.	0.	
CBEAM	56	56	119	120	1.	1.	0.	
CBEAM	57	57	94	79	1.	1.	0.	
CBEAM	141	141	467	274	1.	1.	0.	
CBEAM	142	142	274	465	1.	1.	0.	
CBEAM	143	143	465	275	1.	1.	0.	
CBEAM	144	144	275	278	1.	1.	0.	
CBEAM	145	145	278	280	1.	1.	0.	
CBEAM	146	146	280	292	1.	1.	0.	
CBEAM	147	147	292	114	1.	1.	0.	+147BM
+147BM		456						
CBEAM	148	148	466	273	1.	1.	0.	
CBEAM	149	149	273	464	1.	1.	0.	
CBEAM	150	150	464	276	1.	1.	0.	
CBEAM	151	151	276	279	1.	1.	0.	
CBEAM	152	152	279	290	1.	1.	0.	
CBEAM	153	153	290	293	1.	1.	0.	
CBEAM	154	154	293	79	1.	1.	0.	+154BM
+154BM		456						
CBEAM	160	160	295	300	1.	1.	0.	
CBEAM	161	161	117	300	1.	1.	0.	
CBEAM	162	162	300	79	1.	1.	0.	
CBEAM	163	163	79	114	1.	1.	0.	
CBEAM	164	164	283	295	1.	1.	0.	
CBEAM	165	165	295	294	1.	1.	0.	
CBEAM	166	166	293	292	1.	1.	0.	
CBEAM	167	167	282	291	1.	1.	0.	
CBEAM	168	168	290	280	1.	1.	0.	
CBEAM	169	169	279	271	1.	1.	0.	+169BM
+169BM	456							
CBEAM	170	170	271	278	1.	1.	0.	+170BM
+170BM		56						
CBEAM	171	171	281	277	1.	1.	0.	
CBEAM	172	172	276	275	1.	1.	0.	
CBEAM	173	173	464	465	1.	1.	0.	
CBEAM	174	174	466	467	1.	1.	0.	
CBEAM	175	175	271	272	1.	1.	0.	+175BM
+175BM	46							
CBEAM	176	176	273	241	1.	1.	0.	
CBEAM	177	177	241	299	1.	1.	0.	
CBEAM	178	178	299	272	1.	1.	0.	
CBEAM	179	179	272	274	1.	1.	0.	
CBEAM	180	180	274	233	1.	1.	0.	
CBEAM	181	181	195	296	1.	1.	0.	+181BM
+181BM	56							
CBEAM	182	182	296	196	1.	1.	0.	+182BM
+182BM		56						
CBEAM	1001	1001	33	39	1.	0.	0.	
CBEAM	1002	1002	39	47	1.	0.	0.	
CBEAM	1003	1003	47	56	1.	0.	0.	
CBEAM	1004	1004	56	68	1.	0.	0.	
CBEAM	1005	1005	68	81	1.	0.	0.	
CBEAM	1007	1007	32	38	1.	0.	0.	
CBEAM	1009	1009	30	38	1.	0.	0.	
CBEAM	1010	1010	38	46	1.	0.	0.	
CBEAM	1011	1011	46	55	1.	0.	0.	
CBEAM	1012	1012	55	67	1.	0.	0.	
CBEAM	1013	1013	67	80	1.	0.	0.	
CBEAM	1014	1014	181	182	1.	0.	0.	
CBEAM	1015	1015	182	183	1.	0.	0.	
CBEAM	1016	1016	183	184	1.	0.	0.	
CBEAM	1017	1017	184	185	1.	0.	0.	
CBEAM	1018	1018	185	186	1.	0.	0.	
CBEAM	1020	1020	29	44	1.	0.	0.	
CBEAM	1022	1022	27	44	1.	0.	0.	
CBEAM	1023	1023	44	53	1.	0.	0.	
CBEAM	1024	1024	53	65	1.	0.	0.	
CBEAM	1025	1025	65	78	1.	0.	0.	
CBEAM	1026	1026	187	188	1.	0.	0.	+1026BM
+1026BM	56							
CBEAM	1027	1027	188	189	1.	0.	0.	
CBEAM	1028	1028	189	190	1.	0.	0.	
CBEAM	1029	1029	190	191	1.	0.	0.	
CBEAM	1031	1031	26	52	1.	0.	0.	
CBEAM	1033	1033	25	52	1.	0.	0.	
CBEAM	1034	1034	52	64	1.	0.	0.	
CBEAM	1035	1035	64	245	1.	0.	0.	
CBEAM	1036	1036	64	77	1.	0.	0.	
CBEAM	1037	1037	245	77	1.	0.	0.	
CBEAM	1038	1038	192	193	1.	0.	0.	
CBEAM	1039	1039	193	63	1.	0.	0.	
CBEAM	1040	1040	63	245	1.	0.	0.	
CBEAM	1041	1041	245	76	1.	0.	0.	
CBEAM	1043	1043	24	51	1.	0.	0.	
CBEAM	1045	1045	23	51	1.	0.	0.	
CBEAM	1046	1046	51	62	1.	0.	0.	
CBEAM	1047	1047	22	62	1.	0.	0.	
CBEAM	1048	1048	62	244	1.	0.	0.	
CBEAM	1049	1049	244	75	1.	0.	0.	
CBEAM	1050	1050	75	88	1.	0.	0.	+1050BM
CBEAM	1051	1051	21	61	1.	0.	0.	
CBEAM	1052	1052	61	243	1.	0.	0.	
CBEAM	1053	1053	243	74	1.	0.	0.	+1053BM
+1053BM		56						
CBEAM	1054	1054	74	87	1.	0.	0.	+1054BM
CBEAM	1056	1056	20	60	1.	0.	0.	
CBEAM	1057	1057	60	242	1.	0.	0.	
CBEAM	1058	1058	242	73	1.	0.	0.	+1058BM
+1058BM		56						
CBEAM	1059	1059	73	86	1.	0.	0.	+1059BM
CBEAM	1060	1060	19	143	1.	0.	0.	
CBEAM	1061	1061	143	72	1.	0.	0.	
CBEAM	1062	1062	72	85	1.	0.	0.	+1062BM
CBEAM	1071	1071	33	32	0.	1.	0.	
CBEAM	1072	1072	32	30	0.	1.	0.	
CBEAM	1073	1073	30	181	0.	1.	0.	
CBEAM	1074	1074	181	29	0.	1.	0.	
CBEAM	1075	1075	39	38	0.	1.	0.	
CBEAM	1076	1076	38	182	0.	1.	0.	
CBEAM	1077	1077	182	29	0.	1.	0.	
CBEAM	1078	1078	29	27	0.	1.	0.	
CBEAM	1079	1079	27	187	0.	1.	0.	
CBEAM	1080	1080	187	26	0.	1.	0.	
CBEAM	1081	1081	47	46	0.	1.	0.	
CBEAM	1082	1082	46	183	0.	1.	0.	
CBEAM	1083	1083	183	44	0.	1.	0.	
CBEAM	1084	1084	44	188	0.	1.	0.	
CBEAM	1085	1085	188	26	0.	1.	0.	
CBEAM	1086	1086	26	25	0.	1.	0.	
CBEAM	1087	1087	25	192	0.	1.	0.	
CBEAM	1088	1088	192	24	0.	1.	0.	
CBEAM	1089	1089	24	23	0.	1.	0.	
CBEAM	1090	1090	23	22	0.	1.	0.	
CBEAM	1091	1091	56	55	0.	1.	0.	
CBEAM	1092	1092	55	184	0.	1.	0.	
CBEAM	1093	1093	184	53	0.	1.	0.	
CBEAM	1094	1094	53	189	0.	1.	0.	
CBEAM	1095	1095	189	52	0.	1.	0.	
CBEAM	1096	1096	52	193	0.	1.	0.	
CBEAM	1097	1097	193	51	0.	1.	0.	
CBEAM	1098	1098	51	22	0.	1.	0.	+1098BM
+1098BM		56						
CBEAM	1099	1099	22	21	0.	1.	0.	
CBEAM	1100	1100	21	20	0.	1.	0.	
CBEAM	1101	1101	20	19	0.	1.	0.	
CBEAM	1102	1102	68	67	0.	1.	0.	
CBEAM	1103	1103	67	185	0.	1.	0.	
CBEAM	1104	1104	185	65	0.	1.	0.	
CBEAM	1105	1105	65	190	0.	1.	0.	
CBEAM	1106	1106	190	64	0.	1.	0.	
CBEAM	1107	1107	64	63	0.	1.	0.	
CBEAM	1108	1108	63	62	0.	1.	0.	
CBEAM	1109	1109	62	61	0.	1.	0.	
CBEAM	1110	1110	61	60	0.	1.	0.	
CBEAM	1111	1111	60	19	0.	1.	0.	
CBEAM	1112	1112	245	244	0.	1.	0.	
CBEAM	1113	1113	244	243	0.	1.	0.	
CBEAM	1114	1114	243	242	0.	1.	0.	
CBEAM	1115	1115	242	143	0.	1.	0.	
CBEAM	1116	1116	81	80	0.	1.	0.	
CBEAM	1117	1117	80	186	0.	1.	0.	
CBEAM	1118	1118	186	78	0.	1.	0.	
CBEAM	1119	1119	78	191	0.	1.	0.	
CBEAM	1120	1120	191	77	0.	1.	0.	
CBEAM	1121	1121	77	76	0.	1.	0.	
CBEAM	1122	1122	76	75	0.	1.	0.	
CBEAM	1123	1123	75	74	0.	1.	0.	
CBEAM	1124	1124	74	73	0.	1.	0.	
CBEAM	1125	1125	73	72	0.	1.	0.	
CBEAM	1126	1126	88	87	0.	1.	0.	+1126BM
CBEAM	1127	1127	87	86	0.	1.	0.	
CBEAM	1128	1128	86	85	0.	1.	0.	+1128BM
CBEAM	1131	1131	7	18	1.	0.	0.	
CBEAM	1132	1132	6	16	1.	0.	0.	
CBEAM	1133	1133	16	17	1.	0.	0.	
CBEAM	1134	1134	17	30	1.	0.	0.	+BM1134
+BM1134	5							
CBEAM	1135	1135	176	180	1.	0.	0.	
CBEAM	1136	1136	5	14	1.	0.	0.	
CBEAM	1137	1137	14	15	1.	0.	0.	
CBEAM	1138	1138	15	27	1.	0.	0.	+BM1138
+BM1138	5							
CBEAM	1139	1139	175	179	1.	0.	0.	
CBEAM	1140	1140	4	12	1.	0.	0.	
CBEAM	1141	1141	12	13	1.	0.	0.	
CBEAM	1142	1142	13	25	1.	0.	0.	+BM1142
+BM1142	5							
CBEAM	1143	1143	174	178	1.	0.	0.	
CBEAM	1144	1144	3	10	1.	0.	0.	
CBEAM	1145	1145	10	11	1.	0.	0.	
CBEAM	1146	1146	11	23	1.	0.	0.	+BM1146

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+BM1146 5
CBEAM   1147    1147    173     177     1.      0.      0.
CBEAM   1148    1148    2       194     1.      0.      0.
CBEAM   1149    1149    194     9       1.      0.      0.
CBEAM   1150    1150    9       20      1.      0.      0.              +BM1150
+BM1150 5
CBEAM   1151    1151    1       8       1.      0.      0.
CBEAM   1152    1152    6       7       1.      0.      0.
CBEAM   1153    1153    176     6       1.      0.      0.
CBEAM   1154    1154    5       176     1.      0.      0.
CBEAM   1155    1155    175     5       1.      0.      0.
CBEAM   1156    1156    4       175     1.      0.      0.
CBEAM   1157    1157    174     4       1.      0.      0.
CBEAM   1158    1158    3       174     1.      0.      0.
CBEAM   1159    1159    173     3       1.      0.      0.
CBEAM   1160    1160    2       173     1.      0.      0.
CBEAM   1161    1161    1       2       1.      0.      0.
CBEAM   1162    1162    16      18      1.      0.      0.
CBEAM   1163    1163    180     16      1.      0.      0.
CBEAM   1164    1164    14      180     1.      0.      0.
CBEAM   1165    1165    179     14      1.      0.      0.
CBEAM   1166    1166    12      179     1.      0.      0.
CBEAM   1167    1167    178     12      1.      0.      0.
CBEAM   1168    1168    10      178     1.      0.      0.
CBEAM   1169    1169    177     10      1.      0.      0.
CBEAM   1170    1170    194     177     1.      0.      0.
CBEAM   1171    1171    8       194     1.      0.      0.
CBEAM   1181    1181    81      95      1.      0.      0.              +BM1181
+BM1181         456
CBEAM   1182    1182    95      142     1.      0.      0.
CBEAM   1183    1183    142     101     1.      0.      0.
CBEAM   1184    1184    101     107     1.      0.      0.
CBEAM   1185    1185    107     113     1.      0.      0.
CBEAM   1186    1186    93      141     1.      0.      0.
CBEAM   1187    1187    141     100     1.      0.      0.
CBEAM   1188    1188    100     106     1.      0.      0.
CBEAM   1189    1189    106     112     1.      0.      0.
CBEAM   1190    1190    186     124     1.      0.      0.              +BM1190
+BM1190         456
CBEAM   1191    1191    124     140     1.      0.      0.
CBEAM   1192    1192    140     127     1.      0.      0.
CBEAM   1193    1193    127     130     1.      0.      0.
CBEAM   1194    1194    130     133     1.      0.      0.
CBEAM   1195    1195    92      139     1.      0.      0.
CBEAM   1196    1196    139     99      1.      0.      0.
CBEAM   1197    1197    99      105     1.      0.      0.
CBEAM   1198    1198    105     111     1.      0.      0.
CBEAM   1199    1199    191     123     1.      0.      0.              +BM1199
+BM1199         456
CBEAM   1200    1200    123     138     1.      0.      0.
CBEAM   1201    1201    138     126     1.      0.      0.
CBEAM   1202    1202    126     129     1.      0.      0.
CBEAM   1203    1203    129     132     1.      0.      0.
CBEAM   1204    1204    91      137     1.      0.      0.
CBEAM   1205    1205    137     98      1.      0.      0.
CBEAM   1206    1206    98      104     1.      0.      0.
CBEAM   1207    1207    104     110     1.      0.      0.
CBEAM   1208    1208    122     136     1.      0.      0.
CBEAM   1209    1209    136     125     1.      0.      0.
CBEAM   1210    1210    125     128     1.      0.      0.
CBEAM   1211    1211    128     131     1.      0.      0.
CBEAM   1212    1212    76      90      1.      0.      0.              +BM1212
+BM1212         456
CBEAM   1213    1213    90      135     1.      0.      0.
CBEAM   1214    1214    135     97      1.      0.      0.
CBEAM   1215    1215    97      103     1.      0.      0.
CBEAM   1216    1216    103     109     1.      0.      0.
CBEAM   1217    1217    89      134     1.      0.      0.
CBEAM   1218    1218    134     96      1.      0.      0.
CBEAM   1219    1219    96      102     1.      0.      0.
CBEAM   1220    1220    102     108     1.      0.      0.
CBEAM   1231    1231    141     142     1.      0.      0.
CBEAM   1232    1232    140     141     1.      0.      0.
CBEAM   1233    1233    139     140     1.      0.      0.
CBEAM   1234    1234    138     139     1.      0.      0.
CBEAM   1235    1235    137     138     1.      0.      0.
CBEAM   1236    1236    136     137     1.      0.      0.
CBEAM   1237    1237    135     136     1.      0.      0.
CBEAM   1238    1238    134     135     1.      0.      0.
CBEAM   1241    1241    100     101     1.      0.      0.
CBEAM   1242    1242    127     100     1.      0.      0.
CBEAM   1243    1243    99      127     1.      0.      0.
CBEAM   1244    1244    126     99      1.      0.      0.
CBEAM   1245    1245    98      126     1.      0.      0.
CBEAM   1246    1246    125     98      1.      0.      0.
CBEAM   1247    1247    97      125     1.      0.      0.
CBEAM   1248    1248    96      97      1.      0.      0.
CBEAM   1251    1251    106     107     1.      0.      0.
CBEAM   1252    1252    130     106     1.      0.      0.
CBEAM   1253    1253    105     130     1.      0.      0.
CBEAM   1254    1254    129     105     1.      0.      0.
CBEAM   1255    1255    104     129     1.      0.      0.
CBEAM   1256    1256    128     104     1.      0.      0.
CBEAM   1257    1257    103     128     1.      0.      0.
CBEAM   1258    1258    102     103     1.      0.      0.
CBEAM   1261    1261    112     113     1.      0.      0.
CBEAM   1262    1262    133     112     1.      0.      0.
CBEAM   1263    1263    111     133     1.      0.      0.
CBEAM   1264    1264    132     111     1.      0.      0.
CBEAM   1265    1265    110     132     1.      0.      0.
CBEAM   1266    1266    131     110     1.      0.      0.
CBEAM   1267    1267    109     131     1.      0.      0.
CBEAM   1268    1268    108     109     1.      0.      0.
CBEAM   2001    2001    251     506     1.      1.      0.              +BM2001
+BM2001 456
CBEAM   2002    2002    506     233     1.      1.      0.
CBEAM   2003    2003    233     517     1.      1.      0.
CBEAM   2004    2004    517     262     1.      1.      0.              +BM2004
+BM2004         456
CBEAM   2005    2005    252     507     1.      1.      0.              +BM2005
+BM2005 456
CBEAM   2006    2006    507     257     1.      1.      0.
CBEAM   2007    2007    257     518     1.      1.      0.
CBEAM   2008    2008    518     262     1.      1.      0.              +BM2008
+BM2008         456
CBEAM   2009    2009    253     508     1.      1.      0.              +BM2009
+BM2009 456
CBEAM   2010    2010    508     258     1.      1.      0.
CBEAM   2011    2011    258     519     1.      1.      0.
CBEAM   2012    2012    519     263     1.      1.      0.              +BM2012
+BM2012         456
CBEAM   2013    2013    254     509     1.      1.      0.              +BM2013
+BM2013 456
CBEAM   2014    2014    509     259     1.      1.      0.
CBEAM   2015    2015    259     520     1.      1.      0.
CBEAM   2016    2016    520     264     1.      1.      0.              +BM2016
+BM2016         456
CBEAM   2017    2017    255     510     1.      1.      0.              +BM2017
+BM2017 456
CBEAM   2018    2018    510     260     1.      1.      0.
CBEAM   2019    2019    260     521     1.      1.      0.
CBEAM   2020    2020    521     265     1.      1.      0.              +BM2020
+BM2020         456
CBEAM   2021    2021    256     511     1.      1.      0.              +BM2021
+BM2021 456
CBEAM   2022    2022    511     261     1.      1.      0.              +BM2022
+BM2022         456
CBEAM   2023    2023    261     522     1.      1.      0.              +BM2023
+BM2023 456
CBEAM   2024    2024    522     266     1.      1.      0.              +BM2024
+BM2024         456
CBEAM   2031    2031    251     501     1.      1.      0.              +BM2031
+BM2031 456
CBEAM   2032    2032    501     252     1.      1.      0.
CBEAM   2033    2033    252     502     1.      1.      0.
CBEAM   2034    2034    502     253     1.      1.      0.
CBEAM   2035    2035    253     503     1.      1.      0.
CBEAM   2036    2036    503     254     1.      1.      0.
CBEAM   2037    2037    254     504     1.      1.      0.
CBEAM   2038    2038    504     255     1.      1.      0.
CBEAM   2039    2039    255     505     1.      1.      0.
CBEAM   2040    2040    505     256     1.      1.      0.              +BM2040
+BM2040         456
CBEAM   2041    2041    233     512     1.      1.      0.
CBEAM   2042    2042    512     257     1.      1.      0.
CBEAM   2043    2043    257     513     1.      1.      0.
CBEAM   2044    2044    513     258     1.      1.      0.
CBEAM   2045    2045    258     514     1.      1.      0.
CBEAM   2046    2046    514     259     1.      1.      0.
CBEAM   2047    2047    259     515     1.      1.      0.
CBEAM   2048    2048    515     260     1.      1.      0.
CBEAM   2049    2049    260     516     1.      1.      0.
CBEAM   2050    2050    516     261     1.      1.      0.              +BM2050
+BM2050         456
CBEAM   2051    2051    262     523     1.      1.      0.              +BM2051
+BM2051 456
CBEAM   2052    2052    523     263     1.      1.      0.
CBEAM   2053    2053    263     524     1.      1.      0.
CBEAM   2054    2054    524     264     1.      1.      0.
CBEAM   2055    2055    264     525     1.      1.      0.
CBEAM   2056    2056    525     265     1.      1.      0.
CBEAM   2057    2057    265     526     1.      1.      0.
CBEAM   2058    2058    526     266     1.      1.      0.              +BM2058
+BM2058         456
CBEAM   3026    3026    19      3020    0.      1.      0.
CBEAM   3027    3027    3016    3021    0.      1.      0.
CBEAM   3028    3028    3017    3018    1.      0.      0.
CBEAM   3029    3029    3018    3019    1.      0.      0.
CBEAM   3030    3030    3019    3020    1.      0.      0.
CBEAM   3031    3031    3020    3021    1.      0.      0.
CBEAM   3032    3032    3021    3022    1.      0.      0.              +3032
+3032           5
CBEAM   3081    3081    21      3046    0.      0.      1.              +3081
+3081   56
CBEAM   3082    3082    3046    61      0.      0.      1.              +3082
+3082           56
CBEAM   3083    3083    3046    3049    0.      1.      0.              +3083
+3083           6
CBEAM   3084    3083    3049    3054    0.      1.      0.
CBEAM   3085    3085    3053    3054    0.      0.      1.              +3085
+3085   56
CBEAM   3086    3085    3054    3055    0.      0.      1.              +3086
+3086           56
CBEAM   3087    3087    3047    3053    0.      1.      0.              +3087
+3087           6
CBEAM   3088    3088    3047    3048    0.      0.      1.
CBEAM   3089    3089    3048    3055    0.      1.      0.
CBEAM   3090    3090    3050    3051    0.      0.      1.              +3090
+3090   5
CBEAM   3091    3091    3051    3053    0.      0.      1.
CBEAM   3092    3092    3053    3055    0.      0.      1.
CBEAM   3093    3093    3055    3057    0.      0.      1.              +3093
+3093           5
CBEAM   3094    3094    3050    3053    0.      0.      1.              +3094
+3094   56
CBEAM   3095    3095    3053    3055    0.      0.      1.
CBEAM   3096    3096    3055    3057    0.      0.      1.              +3096
+3096           56
CBEAM   3097    3097    3050    3059    0.      1.      0.              +3097
+3097   46
CBEAM   3098    3098    3051    3061    0.      1.      0.              +3098
+3098   246
CBEAM   3099    3099    3057    3062    0.      1.      0.              +3099
+3099   246
CBEAM   3100    3100    3058    3059    0.      0.      1.
CBEAM   3101    3100    3059    3060    0.      0.      1.
CBEAM   3102    3100    3060    3061    0.      0.      1.
CBEAM   3103    3100    3061    3062    0.      0.      1.
CBEAM   3391    3391    29      3196    0.      0.      1.              +3391
+3391   456
CBEAM   3392    3391    3196    182     0.      0.      1.              +3392
+3392           456
CBEAM   3393    3391    182     3197    0.      0.      1.              +3393
+3393   456
CBEAM   3394    3391    3197    38      0.      0.      1.              +3394
+3394           456
CBEAM   3395    3391    44      3198    0.      0.      1.              +3395
+3395   456
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CBEAM   3396    3391    3198    183     0.      0.      1.              +3396
+3396           456
CBEAM   3397    3391    183     3199    0.      0.      1.              +3397
+3397   456
CBEAM   3398    3391    3199    46      0.      0.      1.              +3398
+3398           456
CBEAM   3399    3391    3198    3200    0.      0.      1.
CBEAM   3400    3391    3200    3196    0.      0.      1.
CBEAM   3401    3391    3199    3202    0.      0.      1.
CBEAM   3402    3391    3202    3197    0.      0.      1.
CBEAM   3403    3391    3200    3201    0.      0.      1.              +3403
+3403   5
CBEAM   3404    3391    3201    3202    0.      0.      1.              +3404
+3404           5
CBEAM   3405    3405    3203    3204    0.      0.      1.
CBEAM   3406    3405    3204    3205    0.      0.      1.
CBEAM   3407    3407    3204    3206    0.      1.      0.              +3407
+3407           6
CBEAM   3408    3407    3206    3207    0.      1.      0.
CBEAM   3409    3409    3207    3208    0.      0.      1.
CBEAM   3410    3409    3209    3212    0.      1.      0.
CBEAM   3411    3405    3210    3211    0.      0.      1.
CBEAM   3412    3409    3211    3212    0.      0.      1.
CBEAM   3413    3405    3212    3213    0.      0.      1.
CBEAM   5002    5002    153     267     1.      0.      0.
CBEAM   5051    5051    156     458     1.      0.      0.
CBEAM   5052    5052    458     459     1.      0.      0.
CBEAM   5053    5053    459     268     1.      0.      0.
CELAS2  61      36.6E6  34      5       35      5
CELAS2  62      71.0E6  40      5       41      5
CELAS2  63      94.1E6  48      5       49      5
CELAS2  64      132.4E6 57      5       58      5
CELAS2  65      110.0E6 69      5       70      5
CELAS2  66      51.7E6  82      5       83      5
CELAS2  67      5.0E6   115     5       116     5
CELAS2  191     11.25E6 277     5       276     5
CELAS2  192     22.0E6  291     5       290     5
CELAS2  193     9.68E6  294     5       293     5
CELAS2  194     156610. 298     3       195     3
CELAS2  195     67829.  284     3       196     3
CELAS2  1172    5650000.17      4       30      4
CELAS2  1173    5590000.15      4       27      4
CELAS2  1174    1600000.13      4       25      4
CELAS2  1175    2030000.11      4       23      4
CELAS2  1221    3307000.142     4       141     4
CELAS2  1222    268300. 141     4       140     4
CELAS2  1223    137300. 140     4       139     4
CELAS2  1224    105200. 139     4       138     4
CELAS2  1225    85600.  138     4       137     4
CELAS2  1226    69900.  137     4       136     4
CELAS2  1227    57700.  136     4       135     4
CELAS2  1228    40000.  135     4       134     4
CELAS2  1229    6229750.142     4       119     4
CELAS2  3104    193.E6  3046    4       3054    4
CELAS2  3414    1515.E5 3204    4       3207    4
CELAS2  3415    1724.E5 3212    4       3208    4
CELAS2  3416    580.4E5 3204    6       3207    6
CELAS2  3417    2652.5E53208    6       3209    6
CELAS2  3418    732.68E53208    5       3209    5
CONM1   301     19      0                                               +301
+301    9.565
CONM1   302     72      0                                               +302
+302    6.770
CONM1   303     20      0                                               +303
+303    7.972
CONM1   304     60      0                                               +304
+304    10.110
CONM1   305     73      0                                               +305
+305    7.755
CONM1   306     21      0                                               +306
+306    13.712
CONM1   307     61      0                                               +307
+307    20.285
CONM1   308     74      0                                               +308
+308    9.982
CONM1   309     51      0                                               +309
+309    32.156
CONM1   310     62      0                                               +310
+310    25.281
CONM1   311     75      0                                               +311
+311    14.285
CONM1   312     26      0                                               +312
+312    42.942
CONM1   313     52      0                                               +313
+313    57.288
CONM1   314     64      0                                               +314
+314    46.648
CONM1   315     77      0                                               +315
+315    20.983
CONM1   316     29      0                                               +316
+316    60.677
CONM1   317     44      0                                               +317
+317    80.964
CONM1   318     53      0                                               +318
+318    74.861
CONM1   319     65      0                                               +319
+319    56.266
CONM1   320     78      0                                               +320
+320    28.341
CONM1   321     33      0                                               +321
+321    37.854
CONM1   322     39      0                                               +322
+322    99.621
CONM1   323     47      0                                               +323
+323    105.244
CONM1   324     56      0                                               +324
+324    95.811
CONM1   325     68      0                                               +325
+325    83.620
CONM1   326     81      0                                               +326
+326    33.148
CONM1   341     85      0                                               +341
+341    .6
CONM1   342     86      0                                               +342
+342    1.6
CONM1   343     87      0                                               +343
+343    1.8
CONM1   344     88      0                                               +344
+344    1.
CONM1   345     6       0                                               +345
+345    12.03
CONM1   346     17      0                                               +346
+346    57.78
CONM1   347     5       0                                               +347
+347    10.08
CONM1   348     15      0                                               +348
+348    42.72
CONM1   349     4       0                                               +349
+349    6.92
CONM1   350     13      0                                               +350
+350    27.67
CONM1   351     3       0                                               +351
+351    5.17
CONM1   352     11      0                                               +352
+352    27.65
CONM1   353     2       0                                               +353
+353    4.08
CONM1   354     9       0                                               +354
+354    3.71
CONM1   355     95      0                                               +355
+355    9.133
CONM1   356     107     0                                               +356
+356    6.765
CONM1   357     113     0                                               +357
+357    .022
CONM1   358     93      0                                               +358
+358    10.32
CONM1   359     106     0                                               +359
+359    10.12
CONM1   360     112     0                                               +360
+360    .149
CONM1   361     124     0                                               +361
+361    5.816
CONM1   362     130     0                                               +362
+362    7.986
CONM1   363     133     0                                               +363
+363    .998
CONM1   364     92      0                                               +364
+364    4.56
CONM1   365     105     0                                               +365
+365    6.797
CONM1   366     111     0                                               +366
+366    .952
CONM1   367     123     0                                               +367
+367    3.296
CONM1   368     129     0                                               +368
+368    4.727
CONM1   369     132     0                                               +369
+369    .647
CONM1   370     91      0                                               +370
+370    2.069
CONM1   371     104     0                                               +371
+371    3.014
CONM1   372     110     0                                               +372
+372    .477
CONM1   373     122     0                                               +373
+373    1.784
CONM1   374     128     0                                               +374
+374    2.632
CONM1   375     131     0                                               +375
+375    .435
CONM1   376     90      0                                               +376
+376    1.644
CONM1   377     103     0                                               +377
+377    2.354
CONM1   378     109     0                                               +378
+378    .272
CONM1   379     89      0                                               +379
+379    .651
CONM1   380     102     0                                               +380
+380    1.075
CONM1   381     108     0                                               +381
+381    .284
CONM1   391     163     0                                               +391
+391    314.21
CONM1   392     153     0                                               +392
+392    463.77
CONM1   393     154     0                                               +393
+393    870.68
CONM1   394     155     0                                               +394
+394    1299.38
CONM1   395     156     0                                               +395
+395    1545.78
CONM1   396     42      0                                               +396
+396    1799.25
CONM1   397     71      0                                               +397
+397    1412.77
CONM1   398     286     0                                               +398
+398    893.77
CONM1   399     284     0                                               +399
+399    335.19
CONM1   400     281     0                                               +400
+400    708.33
CONM1   401     163     0               314.21
CONM1   402     153     0               463.77
CONM1   403     154     0               870.68
CONM1   404     155     0               1299.38
CONM1   405     156     0               1545.78
CONM1   406     42      0               2036.16
CONM1   407     71      0               2468.11
CONM1   408     286     0               893.77
CONM1   409     284     0               311.29
CONM1   410     281     0               796.72
CONM1   411     153     0                                               +411
+411                                                                    +411A
+411A           119126.
CONM1   412     154     0                                               +412
+412                                                                    +412A
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+412A           498740.
CONM1   413     155     0                                               +413
+413                                                                    +413A
+413A           233410.
CONM1   414     156     0                                               +414
+414                                                                    +414A
+414A           865169.
CONM1   415     42      0                                               +415
+415                                                                    +415A
+415A           1051483.
CONM1   416     71      0                                               +416
+416                                                                    +416A
+416A           1042917.
CONM1   417     286     0                                               +417
+417                                                                    +417A
+417A           556929.
CONM1   418     284     0                                               +418
+418                                                                    +418A
+418A           756147.
CONM1   430     195     0                                               +430
+430    -82.94
CONM1   431     296     0                                               +431
+431                                    3803477.
CONM1   432     296     0                                               +432
+432    2073.44
CONM1   433     42      0                       12204.0
CONM1   434     437     0                                               +434
+434                                                                    +434A
+434A                                                           19.7E6
CONM1   435     281     0                                               +435
+435                                                                    +435A
+435A                                                           945062.
CONM1   436     410     0                                               +436
+436                                                                    +436A
+436A           502624.
CONM1   437     410     0                                               +437
+437                                                                    +437A
+437A                                                           3604069.
CONM1   438     410     0       1990.5
CONM1   446     251     0                                               +446
+446    4.65
CONM1   447     252     0                                               +447
+447    5.123
CONM1   448     253     0                                               +448
+448    4.812
CONM1   449     254     0                                               +449
+449    3.069
CONM1   450     255     0                                               +450
+450    1.73
CONM1   451     256     0                                               +451
+451    2.547
CONM1   452     233     0                                               +452
+452    176.302
CONM1   453     257     0                                               +453
+453    31.053
CONM1   454     258     0                                               +454
+454    17.674
CONM1   455     259     0                                               +455
+455    11.742
CONM1   456     260     0                                               +456
+456    7.391
CONM1   457     261     0                                               +457
+457    2.877
CONM1   458     262     0                                               +458
+458    3.675
CONM1   459     263     0                                               +459
+459    3.064
CONM1   460     264     0                                               +460
+460    2.838,
CONM1   461     265     0                                               +461
+461    2.73
CONM1   462     266     0                                               +462
+462    .976
CONM1   501     407     0       18.24
CONM1   502     409     0       24.64
CONM1   503     367     0       23.43
CONM1   504     408     0       30.93
CONM1   505     368     0       4.55
CONM1   506     359     0       15.9
CONM1   507     384     0       15.24
CONM1   508     389     0       .75
CONM1   509     369     0       3.81
CONM1   510     360     0       6.67
CONM1   511     385     0       5.77
CONM1   512     390     0       1.11
CONM1   513     370     0       2.55
CONM1   514     361     0       3.55
CONM1   515     386     0       3.1
CONM1   516     391     0       .93
CONM1   517     371     0       1.12
CONM1   518     362     0       2.9
CONM1   519     387     0       2.4
CONM1   520     392     0       .59
CONM1   521     393     0       .37
CONM1   522     373     0       1.94
CONM1   523     364     0       .48
CONM1   524     381     0       2.66
CONM1   525     383     0       .89
CONM1   526     281                                                     +526
+526                                    822933.
CONM1   3042    3018            56.69           56.69                   +3042
+3042   56.69                           64266.                          +3042A
+3042A          0.                                              64266.
CONM1   3043    3019                                                    +3043
+3043   -4.70
CONM1   3044    3022            35.01           35.01                   +3044
+3044   37.01
CONM1   3045    3060            200.            200.                    +3045
+3045   200.                            236476.8                        +3045A
+3045A          1947.                                           236476.
CONM1   3047    3017                                                    +3047
+3047   .010
CONM1   3117    3046    0                                               +3117
+3117   25.4
CONM1   3118    3049    0                       25.4
CONM1   3119    3050    0       46.57                                   +3119
+3119   46.57
CONM1   3120    3053    0       9.79                                    +3120
+3120   -2.91
CONM1   3121    3054    0                       67.50
CONM1   3122    3057    0       23.84                                   +3122
+3122   23.84
CONM1   3427    3204    0                                               +3427
+3427   208.0                   125.E3
CONM1   3428    3206    0                       208.
CONM1   3429    3207    0       208.0                                   +3429
+3429                                                                   +3429A
+3429A                                                  125.E3
CONM1   3430    3210    0       .01                                     +40430
+40430  .01
CONM1   3431    3211    0       229.3                                   +40431
+40431  229.3                   561149.                                 +40431A
+40431A         32000.                                  561149.
CONM1   3432    3212    0                       231.3
CONM1   3433    3213    0       2.0                                     +40433
+40433  2.0
CONM2   3501    3500            502.    0.      0.      0.              +000001
++000001648549.2        8160.8                  649152.0                +000002
CONM2   3504    3501            138.    0.      0.      0.              +000003
++00000366538.01        6769.7                  62828.60                +000004
CONROD  183     272     233     2                       16.0875
CONROD  2201    233     1233    2       .0001
CONROD  2202    233     2233    2       .0001
CONROD  2203    251     1251    2       .0001
CONROD  2204    251     2251    2       .0001
CONROD  2205    252     1252    2       .0001
CONROD  2206    252     2252    2       .0001
CONROD  2207    253     1253    2       .0001
CONROD  2208    253     2253    2       .0001
CONROD  2209    254     1254    2       .0001
CONROD  2210    254     2254    2       .0001
CONROD  2211    255     1255    2       .0001
CONROD  2212    255     2255    2       .0001
CONROD  2213    256     1256    2       .0001
CONROD  2214    256     2256    2       .0001
CONROD  2215    257     1257    2       .0001
CONROD  2216    257     2257    2       .0001
CONROD  2217    258     1258    2       .0001
CONROD  2218    258     2258    2       .0001
CONROD  2219    259     1259    2       .0001
CONROD  2220    259     2259    2       .0001
CONROD  2221    260     1260    2       .0001
CONROD  2222    260     2260    2       .0001
CONROD  2223    261     1261    2       .0001
CONROD  2224    261     2261    2       .0001
CONROD  2225    262     1262    2       .0001
CONROD  2226    262     2262    2       .0001
CONROD  2227    263     1263    2       .0001
CONROD  2228    263     2263    2       .0001
CONROD  2229    264     1264    2       .0001
CONROD  2230    264     2264    2       .0001
CONROD  2231    265     1265    2       .0001
CONROD  2232    265     2265    2       .0001
CONROD  2233    266     1266    2       .0001
CONROD  2234    266     2266    2       .0001
CONROD  3033    3018    3020    2               20.
CONROD  3034    3020    3022    2               20.
CORD1R  5       701     702     703
CORD2C *3               0               -63.574         -294.247        *CORD3A
*CORD3A 0.              -143.398002     -351.530085     0.              +CORD3B
+CORD3B -63.574 -294.247100.
CORD2R  1       0       -62.153 -293.2270.      -62.153 -293.227100.    *CORD1
*CORD1  19.092002       -234.923915     0.
CORD2R  7       0       -41.5   -378.02 0.      -41.5   -378.02 100.    *CORD7
*CORD7  57.2946361      -362.5403399    0.
CQUAD4  601     601     1033    1039    1038    1032
CQUAD4  602     602     1039    1047    1046    1038
CQUAD4  603     603     1047    1056    1055    1046
CQUAD4  604     604     1056    1068    1067    1055
CQUAD4  605     605     1068    1081    1080    1067
CQUAD4  607     607     1038    1182    1181    1030
CQUAD4  608     608     1038    1046    1183    1182
CQUAD4  609     609     1046    1055    1184    1183
CQUAD4  610     610     1055    1067    1185    1184
CQUAD4  611     611     1067    1080    1186    1185
CQUAD4  613     613     1182    1183    1044    1029
CQUAD4  614     614     1183    1184    1053    1044
CQUAD4  615     615     1184    1185    1065    1053
CQUAD4  616     616     1185    1186    1078    1065
CQUAD4  618     618     1027    1044    1188    1187
CQUAD4  619     619     1044    1053    1189    1188
CQUAD4  620     620     1053    1065    1190    1189
CQUAD4  621     621     1065    1078    1191    1190
CQUAD4  623     623     1188    1189    1052    1026
CQUAD4  624     624     1189    1190    1064    1052
CQUAD4  625     625     1190    1191    1077    1064
CQUAD4  627     627     1025    1052    1193    1192
CQUAD4  628     628     1052    1064    1063    1193
CQUAD4  632     632     1192    1193    1051    1024
CQUAD4  633     633     1193    1063    1062    1051
CQUAD4  634     634     1063    1245    1244    1062
CQUAD4  635     635     1245    1076    1075    1244
CQUAD4  639     639     1062    1061    1021    1022
CQUAD4  640     640     1062    1244    1243    1061
CQUAD4  641     641     1244    1075    1074    1243
CQUAD4  643     643     1021    1061    1060    1020
CQUAD4  644     644     1061    1243    1242    1060
CQUAD4  645     645     1243    1074    1073    1242
CQUAD4  648     648     1060    1242    1143    1019
CQUAD4  649     649     1242    1073    1072    1143
CQUAD4  661     661     1142    1101    1100    1141
CQUAD4  662     662     1101    1107    1106    1100
CQUAD4  663     663     1107    1113    1112    1106
CQUAD4  664     664     1141    1100    1127    1140
CQUAD4  665     665     1100    1106    1130    1127
CQUAD4  666     666     1106    1112    1133    1130
CQUAD4  667     667     1140    1127    1099    1139
CQUAD4  668     668     1127    1130    1105    1099
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CQUAD4  669     669     1130    1133    1111    1105
CQUAD4  670     670     1139    1099    1126    1138
CQUAD4  671     671     1099    1105    1129    1126
CQUAD4  672     672     1105    1111    1132    1129
CQUAD4  673     673     1138    1126    1098    1137
CQUAD4  674     674     1126    1129    1104    1098
CQUAD4  675     675     1129    1132    1110    1104
CQUAD4  676     676     1137    1098    1125    1136
CQUAD4  677     677     1098    1104    1128    1125
CQUAD4  678     678     1104    1110    1131    1128
CQUAD4  679     679     1136    1125    1097    1135
CQUAD4  680     680     1125    1128    1103    1097
CQUAD4  681     681     1128    1131    1109    1103
CQUAD4  682     682     1135    1097    1096    1134
CQUAD4  683     683     1097    1103    1102    1096
CQUAD4  684     684     1103    1109    1108    1102
CQUAD4  1601    601     2033    2039    2038    2032
CQUAD4  1602    602     2039    2047    2046    2038
CQUAD4  1603    603     2047    2056    2055    2046
CQUAD4  1604    604     2056    2068    2067    2055
CQUAD4  1605    605     2068    2081    2080    2067
CQUAD4  1607    607     2038    2182    2181    2030
CQUAD4  1608    608     2038    2046    2183    2182
CQUAD4  1609    609     2046    2055    2184    2183
CQUAD4  1610    610     2055    2067    2185    2184
CQUAD4  1611    611     2067    2080    2186    2185
CQUAD4  1613    613     2182    2183    2044    2029
CQUAD4  1614    614     2183    2184    2053    2044
CQUAD4  1615    615     2184    2185    2065    2053
CQUAD4  1616    616     2185    2186    2078    2065
CQUAD4  1618    618     2027    2044    2188    2187
CQUAD4  1619    619     2044    2053    2189    2188
CQUAD4  1620    620     2053    2065    2190    2189
CQUAD4  1621    621     2065    2078    2191    2190
CQUAD4  1623    623     2188    2189    2052    2026
CQUAD4  1624    624     2189    2190    2064    2052
CQUAD4  1625    625     2190    2191    2077    2064
CQUAD4  1627    627     2025    2052    2193    2192
CQUAD4  1628    628     2052    2064    2063    2193
CQUAD4  1632    632     2192    2193    2051    2024
CQUAD4  1633    633     2193    2063    2062    2051
CQUAD4  1634    634     2063    2245    2244    2062
CQUAD4  1635    635     2245    2076    2075    2244
CQUAD4  1639    639     2062    2061    2021    2022
CQUAD4  1640    640     2062    2244    2243    2061
CQUAD4  1641    641     2244    2075    2074    2243
CQUAD4  1643    643     2021    2061    2060    2020
CQUAD4  1644    644     2061    2243    2242    2060
CQUAD4  1645    645     2243    2074    2073    2242
CQUAD4  1648    648     2060    2242    2143    2019
CQUAD4  1649    649     2242    2073    2072    2143
CQUAD4  1661    661     2142    2101    2100    2141
CQUAD4  1662    662     2101    2107    2106    2100
CQUAD4  1663    663     2107    2113    2112    2106
CQUAD4  1664    664     2141    2100    2127    2140
CQUAD4  1665    665     2100    2106    2130    2127
CQUAD4  1666    666     2106    2112    2133    2130
CQUAD4  1667    667     2140    2127    2099    2139
CQUAD4  1668    668     2127    2130    2105    2099
CQUAD4  1669    669     2130    2133    2111    2105
CQUAD4  1670    670     2139    2099    2126    2138
CQUAD4  1671    671     2099    2105    2129    2126
CQUAD4  1672    672     2105    2111    2132    2129
CQUAD4  1673    673     2138    2126    2098    2137
CQUAD4  1674    674     2126    2129    2104    2098
CQUAD4  1675    675     2129    2132    2110    2104
CQUAD4  1676    676     2137    2098    2125    2136
CQUAD4  1677    677     2098    2104    2128    2125
CQUAD4  1678    678     2104    2110    2131    2128
CQUAD4  1679    679     2136    2125    2097    2135
CQUAD4  1680    680     2125    2128    2103    2097
CQUAD4  1681    681     2128    2131    2109    2103
CQUAD4  1682    682     2135    2097    2096    2134
CQUAD4  1683    683     2097    2103    2102    2096
CQUAD4  1684    684     2103    2109    2108    2102
CQUAD8  701     701     1257    1252    1251    1233    1507    1501    +701
+701    1506    1512                                    99.5
CQUAD8  702     702     1252    1257    1258    1253    1507    1513    +702
+702    1508    1502                                    99.5
CQUAD8  703     703     1253    1258    1259    1254    1508    1514    +703
+703    1509    1503                                    99.5
CQUAD8  704     704     1254    1259    1260    1255    1509    1515    +704
+704    1510    1504                                    99.5
CQUAD8  705     705     1255    1260    1261    1256    1510    1516    +705
+705    1511    1505                                    99.5
CQUAD8  707     707     1257    1262    1263    1258    1518    1523    +707
+707    1519    1513                                    99.5
CQUAD8  708     708     1258    1263    1264    1259    1519    1524    +708
+708    1520    1514                                    99.5
CQUAD8  709     709     1259    1264    1265    1260    1520    1525    +709
+709    1521    1515                                    99.5
CQUAD8  710     710     1260    1265    1266    1261    1521    1526    +710
+710    1522    1516                                    99.5
CQUAD8  1701    701     2257    2252    2251    2233    2507    2501    +1701
+1701   2506    2512                                    99.5
CQUAD8  1702    702     2252    2257    2258    2253    2507    2513    +1702
+1702   2508    2502                                    99.5
CQUAD8  1703    703     2253    2258    2259    2254    2508    2514    +1703
+1703   2509    2503                                    99.5
CQUAD8  1704    704     2254    2259    2260    2255    2509    2515    +1704
+1704   2510    2504                                    99.5
CQUAD8  1705    705     2255    2260    2261    2256    2510    2516    +1705
+1705   2511    2505                                    99.5
CQUAD8  1707    707     2257    2262    2263    2258    2518    2523    +1707
+1707   2519    2513                                    99.5
CQUAD8  1708    708     2258    2263    2264    2259    2519    2524    +1708
+1708   2520    2514                                    99.5
CQUAD8  1709    709     2259    2264    2265    2260    2520    2525    +1709
+1709   2521    2515                                    99.5
CQUAD8  1710    710     2260    2265    2266    2261    2521    2526    +1710
+1710   2522    2516                                    99.5
CSHEAR  71      71      1034    1040    1037    1031
CSHEAR  72      72      1040    1048    1045    1037
CSHEAR  73      73      1048    1057    1054    1045
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CSHEAR  74      74      1057    1069    1066    1054
CSHEAR  75      75      1069    1082    1121    1066
CSHEAR  76      76      1094    1079    1114    1121
CSHEAR  77      71      2034    2040    2037    2031
CSHEAR  78      72      2040    2048    2045    2037
CSHEAR  79      73      2048    2057    2054    2045
CSHEAR  80      74      2057    2069    2066    2054
CSHEAR  81      75      2069    2082    2121    2066
CSHEAR  82      76      2094    2079    2114    2121
CSHEAR  201     201     1465    1464    1466    1467
CSHEAR  202     202     1275    1276    1464    1465
CSHEAR  203     203     1280    1290    1276    1275
CSHEAR  204     204     1114    1079    1293    1292
CSHEAR  205     201     2465    2464    2466    2467
CSHEAR  206     202     2275    2276    2464    2465
CSHEAR  207     203     2280    2290    2276    2275
CSHEAR  208     204     2114    2079    2293    2292
CSHEAR  642     642     1075    1088    1087    1074
CSHEAR  646     646     1074    1087    1086    1073
CSHEAR  650     650     1073    1086    1085    1072
CSHEAR  651     651     1007    1018    1016    1006
CSHEAR  652     652     1006    1016    1180    1176
CSHEAR  653     653     1176    1180    1014    1005
CSHEAR  654     654     1005    1014    1179    1175
CSHEAR  655     655     1175    1179    1012    1004
CSHEAR  656     656     1004    1012    1178    1174
CSHEAR  657     657     1174    1178    1010    1003
CSHEAR  658     658     1003    1010    1177    1173
CSHEAR  659     659     1173    1177    1194    1002
CSHEAR  660     660     1002    1194    1008    1001
CSHEAR  1642    642     2075    2088    2087    2074
CSHEAR  1646    646     2074    2087    2086    2073
CSHEAR  1650    650     2073    2086    2085    2072
CSHEAR  1651    651     2007    2018    2016    2006
CSHEAR  1652    652     2006    2016    2180    2176
CSHEAR  1653    653     2176    2180    2014    2005
CSHEAR  1654    654     2005    2014    2179    2175
CSHEAR  1655    655     2175    2179    2012    2004
CSHEAR  1656    656     2004    2012    2178    2174
CSHEAR  1657    657     2174    2178    2010    2003
CSHEAR  1658    658     2003    2010    2177    2173
CSHEAR  1659    659     2173    2177    2194    2002
CSHEAR  1660    660     2002    2194    2008    2001
CSHEAR  3105    3105    3063    3064    3066    3065
CSHEAR  3106    3105    3067    3068    3070    3069
CTRIA3  606     606     1032    1038    1030
CTRIA3  612     612     1181    1182    1029
CTRIA3  617     617     1029    1044    1027
CTRIA3  622     622     1187    1188    1026
CTRIA3  626     626     1026    1052    1025
CTRIA3  629     629     1064    1245    1063
CTRIA3  630     630     1064    1077    1245
CTRIA3  631     631     1077    1076    1245
CTRIA3  636     636     1051    1023    1024
CTRIA3  637     637     1051    1022    1023
CTRIA3  638     638     1062    1022    1051
CTRIA3  647     647     1019    1020    1060
CTRIA3  1606    606     2032    2038    2030
CTRIA3  1612    612     2181    2182    2029
CTRIA3  1617    617     2029    2044    2027
CTRIA3  1622    622     2187    2188    2026
CTRIA3  1626    626     2026    2052    2025
CTRIA3  1629    629     2064    2245    2063
CTRIA3  1630    630     2064    2077    2245
CTRIA3  1631    631     2077    2076    2245
CTRIA3  1636    636     2051    2023    2024
CTRIA3  1637    637     2051    2022    2023
CTRIA3  1638    638     2062    2022    2051
CTRIA3  1647    647     2019    2020    2060
CTRIA6  706     706     1262    1257    1233    1518    1512    1517    +706
+706    99.5
CTRIA6  1706    706     2262    2257    2233    2518    2512    2517    +1706
+1706   99.5
DMIG    VTAIL   0       6       1       0
DMIG    *VTAIL          357             1                               *9001
*9001   357             1               0.127440E+06
DMIG    *VTAIL          358             1                               *9002
*9002   357             1               -.217072E+05                    *9003
*9003   358             1               0.680871E+05
DMIG    *VTAIL          359             1                               *9004
*9004   357             1               0.352175E+03                    *9005
*9005   358             1               -.193333E+05                    *9006
*9006   359             1               0.717224E+05
DMIG    *VTAIL          360             1                               *9007
*9007   357             1               0.456481E+03                    *9008
*9008   358             1               -.301624E+03                    *9009
*9009   359             1               -.903472E+04                    *9010
*9010   360             1               0.507642E+05
DMIG    *VTAIL          361             1                               *9011
*9011   357             1               -.131707E+02                    *9012
*9012   358             1               0.315215E+03                    *9013
*9013   359             1               -.103102E+04                    *9014
*9014   360             1               -.504458E+04                    *9015
*9015   361             1               0.468148E+05
DMIG    *VTAIL          362             1                               *9016
*9016   357             1               0.739752E+00                    *9017
*9017   358             1               -.313943E+02                    *9018
*9018   359             1               0.841453E+02                    *9019
*9019   360             1               0.764191E+02                    *9020
*9020   361             1               -.117072E+05                    *9021
*9021   362             1               0.484915E+05
DMIG    *VTAIL          363             1                               *9022
*9022   357             1               0.363626E+00                    *9023
*9023   358             1               -.206621E+01                    *9024
*9024   359             1               0.170371E+02                    *9025
*9025   360             1               -.128679E+03                    *9026
*9026   361             1               0.142936E+04                    *9027
*9027   362             1               -.141053E+05                    *9028
*9028   363             1               0.334950E+05
DMIG    *VTAIL          364             1                               *9029
*9029   357             1               -.178665E+00                    *9030
*9030   358             1               0.286879E+01                    *9031
*9031   359             1               -.179730E+02                    *9032
*9032   360             1               0.822153E+02                    *9033
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*9033	361	1	-.308830E+03	*9034
*9034	362	1	0.163581E+04	*9035
*9035	363	1	-.934300E+04	*9036
*9036	364	1	0.133364E+05	
DMIG	*VTAIL	367	1	*9037
*9037	357	1	0.156429E+04	*9038
*9038	358	1	-.126722E+05	*9039
*9039	359	1	-.249630E+02	*9040
*9040	360	1	0.252357E+03	*9041
*9041	361	1	0.220342E+02	*9042
*9042	362	1	-.348368E+01	*9043
*9043	363	1	0.213553E-02	*9044
*9044	364	1	0.287588E+00	*9045
*9045	367	1	0.573159E+05	
DMIG	*VTAIL	368	1	*9046
*9046	357	1	0.150006E+03	*9047
*9047	358	1	-.349447E+04	*9048
*9048	359	1	-.184666E+05	*9049
*9049	360	1	-.597411E+03	*9050
*9050	361	1	0.413201E+03	*9051
*9051	362	1	-.489800E+02	*9052
*9052	363	1	-.271009E+00	*9053
*9053	364	1	-.202789E+01	*9054
*9054	367	1	-.502776E+04	*9055
*9055	368	1	0.246725E+05	
DMIG	*VTAIL	369	1	*9056
*9056	357	1	0.292477E+03	*9057
*9057	358	1	0.106678E+04	*9058
*9058	359	1	-.372974E+04	*9059
*9059	360	1	-.163066E+05	*9060
*9060	361	1	-.720338E+03	*9061
*9061	362	1	0.400484E+03	*9062
*9062	363	1	0.516836E+00	*9063
*9063	364	1	-.141972E+02	*9064
*9064	367	1	0.245134E+03	*9065
*9065	368	1	-.625047E+04	*9066
*9066	369	1	0.208907E+05	
DMIG	*VTAIL	370	1	*9067
*9067	357	1	0.109520E+02	*9068
*9068	358	1	-.429165E+02	*9069
*9069	359	1	0.371999E+03	*9070
*9070	360	1	-.238343E+04	*9071
*9071	361	1	-.147446E+05	*9072
*9072	362	1	0.690143E+03	*9073
*9073	363	1	0.723676E+03	*9074
*9074	364	1	0.244021E+02	*9075
*9075	367	1	-.574195E+02	*9076
*9076	368	1	0.416297E+03	*9077
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*9078	370	1	0.182966E+05	
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*9080	358	1	-.105520E+02	*9081
*9081	359	1	0.537074E+02	*9082
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*9083	361	1	-.455381E+03	*9084
*9084	362	1	-.131301E+05	*9085
*9085	363	1	0.208463E+04	*9086
*9086	364	1	-.271085E+03	*9087
*9087	367	1	0.123231E+02	*9088
*9088	368	1	-.234544E+03	*9089
*9089	369	1	0.874696E+03	*9090
*9090	370	1	-.744486E+04	*9091
*9091	371	1	0.300624E+05	
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*9093	358	1	-.677371E+01	*9094
*9094	359	1	-.134083E+02	*9095
*9095	360	1	0.577641E+02	*9096
*9096	361	1	0.669330E+02	*9097
*9097	362	1	-.915742E+03	*9098
*9098	363	1	-.544593E+04	*9099
*9099	364	1	0.116824E+04	*9100
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*9105	372	1	0.276338E+05	
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*9107	358	1	0.440965E+00	*9108
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*9111	362	1	0.411035E+01	*9112
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*9125	361	1	0.195618E+03	*9126
*9126	362	1	-.247898E+02	*9127
*9127	363	1	0.635440E+01	*9128
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*9129	367	1	0.378804E+03	*9130
*9130	368	1	-.142639E+04	*9131
*9131	369	1	0.123205E+04	*9132
*9132	370	1	0.216183E+03	*9133
*9133	371	1	-.467290E+02	*9134
*9134	372	1	0.428324E+01	*9135
*9135	373	1	-.914807E+00	*9136
*9136	375	1	0.925573E+06	
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*9139	359	1	-.272521E+05	*9140
*9140	360	1	0.153243E+04	*9141
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*9144	364	1	0.583973E+00	*9145
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*9155	358	1	0.219380E+04	*9156
*9156	359	1	0.208271E+04	*9157
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*9161	364	1	-.211053E+00	*9162
*9162	367	1	0.716540E+03	*9163
*9163	368	1	0.171546E+04	*9164
*9164	369	1	0.884905E+03	*9165
*9165	370	1	0.158823E+04	*9166
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*9167	372	1	0.690199E+02	*9168
*9168	373	1	0.714289E+01	*9169
*9169	375	1	0.363833E+04	*9170
*9170	376	1	-.187741E+05	*9171
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*9173	358	1	0.133390E+03	*9174
*9174	359	1	0.711357E+03	*9175
*9175	360	1	0.202839E+04	*9176
*9176	361	1	-.261682E+05	*9177
*9177	362	1	0.139574E+04	*9178
*9178	363	1	0.872899E+03	*9179
*9179	364	1	0.177372E+03	*9180
*9180	367	1	0.741269E+02	*9181
*9181	368	1	0.487425E+03	*9182
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*9183	370	1	0.188910E+04	*9184
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*9188	376	1	0.178520E+04	*9189
*9189	377	1	-.113866E+05	*9190
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*9191	357	1	0.555097E+00	*9192
*9192	358	1	-.383492E+02	*9193
*9193	359	1	0.749947E+02	*9194
*9194	360	1	0.542347E+03	*9195
*9195	361	1	0.295398E+04	*9196
*9196	362	1	-.156110E+05	*9197
*9197	363	1	0.237945E+03	*9198
*9198	364	1	0.100000E+04	*9199
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*9202	370	1	0.123586E+04	*9203
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*9206	375	1	0.693183E+02	*9207
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*9212	358	1	0.121017E+01	*9213
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*9215	361	1	0.491571E+03	*9216
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*9221	369	1	0.222733E+02	*9222
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*9223	371	1	0.570111E+03	*9224
*9224	372	1	0.211878E+04	*9225
*9225	373	1	0.303574E+03	*9226
*9226	375	1	-.236553E+02	*9227
*9227	376	1	0.872011E+02	*9228
*9228	377	1	-.226099E+03	*9229
*9229	378	1	0.236420E+04	*9230
*9230	379	1	-.100636E+05	*9231
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DMIG	*VTAIL	381	1	*9232
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*9245	372	1	0.878765E+02	*9246
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*9426   379     1       -.362756E+03    *9427
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*9429   382     1       -.303660E+04    *9430
*9430   383     1       -.859051E+03    *9431
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*9435   388     1       0.483130E+05
DMIG    *VTAIL  389     1               *9436
*9436   357     1       0.103213E+02    *9437
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*9438   359     1       -.573260E+01    *9439
*9439   360     1       -.121702E+01    *9440
*9440   361     1       -.236861E+00    *9441
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*9442   363     1       -.144762E-02    *9443
*9443   364     1       -.112184E-02    *9444
*9444   367     1       0.453988E+00    *9445
*9445   368     1       -.269597E+01    *9446
*9446   369     1       -.204739E+01    *9447
*9447   370     1       -.141008E+00    *9448
*9448   371     1       0.258631E-01    *9449
*9449   372     1       -.242338E-02    *9450
*9450   373     1       -.297737E-03    *9451
*9451   375     1       0.292616E+04    *9452
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*9458   382     1       0.185448E-05    *9459
*9459   383     1       -.168094E-05    *9460
*9460   384     1       -.237751E+04    *9461
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*9462   386     1       0.147890E+03    *9463
*9463   387     1       -.464456E+02    *9464
*9464   388     1       0.463955E+01    *9465
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DMIG    *VTAIL  390     1               *9466
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*9466	384	1	0.243494E+04	*9467
*9467	385	1	-.408017E+04	*9468
*9468	386	1	0.137165E+04	*9469
*9469	389	1	-.414326E+04	*9470
*9470	390	1	0.591447E+04	
DMIG	*VTAIL	391	1	*9471
*9471	385	1	0.137165E+04	*9472
*9472	386	1	-.273356E+04	*9473
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*9475	390	1	-.160803E+04	*9476
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DMIG	*VTAIL	392	1	*9477
*9477	386	1	0.123460E+04	*9478
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DMIG	*VTAIL	393	1	*9484
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*9485	388	1	-.673689E+03	*9486
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*9487	390	1	-.993771E+01	*9488
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*9490	393	1	0.521340E+03	
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*9492	358	1	-.280045E+04	*9493
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*9495	361	1	0.398450E+03	*9496
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*9497	363	1	0.243519E+01	*9498
*9498	364	1	0.188718E+01	*9499
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*9500	368	1	0.453518E+04	*9501
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*9597	369	1	-.147636E+03	*9598
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*9601	373	1	-.214697E-01	*9602
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*9616	389	1	-.442150E+03	*9617
*9617	406	1	-.361694E+06	*9618
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*9684	388	1	0.666356E-01	*9685
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*9688	407	1	0.785184E+04	*9689
*9689	408	1	0.172562E+04	*9690
*9690	409	5	0.179613E+06	*9691
*9691	409	1	0.431661E+05	
DMIG	*VTAIL	409	5	*9621
*9621	357	1	-.108056E+06	*9622
*9622	358	1	-.369272E+04	*9623
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*9624	360	1	-.236393E+04	*9625
*9625	361	1	-.229630E+03	*9626
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*9644	383	1	-.417601E-02	*9645
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+EIG1   MAX
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GRID    2       5       -131.7509.602   .000    0
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GRID    10      5       -100.7503.353   .000    0
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PBAR    2440    2       100.0   100.0   .00001  .001                    +2440
+2440                                                                   +2440A
+2440A  1.      .0000001
PBAR    2441    2       100.0   100.0   .00001  .001                    +2441
+2441                                                                   +2441A
+2441A  1.      .0000001
PBAR    2442    2       100.0   100.0   .00001  .001                    +2442
+2442                                                                   +2442A
+2442A  1.      .0000001
PBAR    2443    2       100.0   100.0   .00001  .001                    +2443
+2443                                                                   +2443A
+2443A  1.      .0000001
PBAR    2444    2       100.0   100.0   .00001  .001                    +2444
+2444                                                                   +2444A
+2444A  1.      .0000001
PBAR    2445    2       100.0   100.0   .00001  .001                    +2445
+2445                                                                   +2445A
+2445A  1.      .0000001
PBAR    2446    2       100.0   100.0   .00001  .001                    +2446
+2446                                                                   +2446A
+2446A  1.      .0000001
PBAR    2447    2       100.0   100.0   .00001  .001                    +2447
+2447                                                                   +2447A
+2447A  1.      .0000001
PBAR    2448    2       100.0   100.0   .00001  .001                    +2448
+2448                                                                   +2448A
+2448A  1.      .0000001
PBAR    2449    2       100.0   100.0   .00001  .001                    +2449
+2449                                                                   +2449A
+2449A  1.      .0000001
PBAR    2450    2       100.0   100.0   .00001  .001                    +2450
+2450                                                                   +2450A
+2450A  1.      .0000001
PBAR    2451    2       100.0   100.0   .00001  .001                    +2451
+2451                                                                   +2451A
+2451A  1.      .0000001
PBAR    2452    2       100.0   100.0   .00001  .001                    +2452
+2452                                                                   +2452A
+2452A  1.      .0000001
PBAR    2453    2       100.0   100.0   .00001  .001                    +2453
+2453                                                                   +2453A
+2453A  1.      .0000001
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+2454                                                                   +2454A
+2454A  1.      .0000001
PBAR    2455    2       100.0   100.0   .00001  .001                    +2455
+2455                                                                   +2455A
+2455A  1.      .0000001
PBAR    2456    2       100.0   100.0   .00001  .001                    +2456
+2456                                                                   +2456A
+2456A  1.      .0000001
PBAR    2457    2       100.0   100.0   .00001  .001                    +2457
+2457                                                                   +2457A
+2457A  1.      .0000001
PBAR    2458    2       100.0   100.0   .00001  .001                    +2458
+2458                                                                   +2458A
+2458A  1.      .0000001
PBAR    2459    2       100.0   100.0   .00001  .001                    +2459
+2459                                                                   +2459A
+2459A  1.      .0000001
PBAR    2460    2       100.0   100.0   .00001  .001                    +2460
+2460                                                                   +2460A
+2460A  1.      .0000001
PBAR    3502    2       10000.  99990.  99990.  99990.
PBEAM   1       2       .690    480.000 371.450         .001            +1
+1      NO      1.0             593.000 547.400                         +1A
+1A     0.      1.
PBEAM   2       2       .690    593.000 547.400         .001            +2
+2      NO      1.0             736.000 606.050                         +2A
+2A     0.      1.
PBEAM   3       2       4.140   896.000 655.500         640.            +3
+3      NO      1.0             912.000 656.500                         +3A
+3A     0.      1.
PBEAM   4       2       4.140   912.000 656.500         2175.           +4
+4      NO      1.0             3104.0001780.000                        +4A
+4A     0.      1.
PBEAM   5       2       4.140   3104.0001780.000        2770.           +5
+5      NO      1.0             6240.0003625.000                        +5A
+5A     0.      1.
PBEAM   6       2       3.600   8000.0004245.000        5250.           +6
+6      NO      1.0             7900.0004430.000                        +6A
+6A     0.      1.
PBEAM   7       2       1980.0007900.0004430.000        5250.           +7
+7      NO      1.0             8100.0004170.000                        +7A
+7A     0.      1.
PBEAM   8       2       1980.0008100.0004170.000        5250.           +8
+8      NO      1.0             9400.0003900.000                        +8A
+8A     0.      1.
PBEAM   9       2       1980.0009400.0003900.000        5250.           +9
+9      NO      1.0             9400.0003887.062                        +9A
+9A     0.      1.
PBEAM   10      2       1980.0009400.0003887.062        5250.           +10
+10     NO      1.0             10100.003670.000                        +10A
+10A    0.      1.
PBEAM   11      2       1980.00010100.003670.000        5250.           +11
+11     NO      1.0             1000.0003691.000                        +11A
+11A    0.      1.
PBEAM   12      2       1980.0001000.0003691.000        5250.           +12
+12     NO      1.0             9600.0003700.000                        +12A
+12A    0.      1.
PBEAM   13      2       1980.0009600.0003700.000        5250.           +13
+13     NO      1.0             8750.0003780.000                        +13A
+13A    0.      1.
PBEAM   14      2       1980.0008750.0003780.000        5250.           +14
+14     NO      1.0             8123.6303590.000                        +14A
+14A    0.      1.
PBEAM   15      2       1980.0008123.6303590.000        5250.           +15
+15     NO      1.0             7200.0003340.000                        +15A
+15A    0.      1.
PBEAM   16      2       1980.0007200.0003340.000        5067.5          +16
+16     NO      1.0             6425.0001872.000                        +16A
+16A    0.      1.
PBEAM   17      2       1980.0006425.0  1872.00         4910.0          +17
+17     NO      1.0     1980.0006375.0  1791.00                         +17A
+17A    0.      1.              .0000
PBEAM   18      2       1980.0006375.0  1791.00         4725.0          +18
+18     NO      1.0     1980.0006200.0  1470.00                         +18A
+18A    0.      1.              .0000
PBEAM   19      2       1980.0006200.0  1470.00         4515.0          +19
+19     NO      1.0     1980.0006900.0  1374.00                         +19A
+19A    0.      1.              .0000
PBEAM   20      2       1980.0006900.0  1374.00         4375.5          +20
+20     NO      1.0     1980.0008250.0  1167.00                         +20A
+20A    0.      1.              .0000
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+21     NO      1.0     1980.0008250.0  960.00                          +21A
+21A    0.      1.              .0000
PBEAM   22      2       1.      8250.000960.00          3885.           +22
+22     NO      1.0             8250.000                                +22A
+22A    0.      0.
PBEAM   31      2       200.000 9999.0  99999.00        .01             +31
+31     NO      1.0     197.000
PBEAM   32      2       200.000 9999.0  99999.00        .01             +32
+32     NO      1.0     200.000
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+33     NO      1.0     207.000
PBEAM   34      2       200.000 9999.0  99999.00        .01             +34
+34     NO      1.0     215.000
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+35     NO      1.0     219.000
PBEAM   36      2       200.000 9999.0  99999.00        .01             +36
+36     NO      1.0     222.000
PBEAM   37      2       1980.0009999.0  9999.00         .01             +37
+37     NO      1.0     1188.000
PBEAM   38      2       1.970   9999.0  251.45          .01             +38
+38     NO      1.0     .950            49.35
PBEAM   39      2       4.140   9999.0  323.80                          +39
+39     NO      1.0     2.140           123.20
PBEAM   40      2       4.140   9999.0  284.10                          +40
+40     NO      1.0     2.180           140.90
PBEAM   41      2       5.590   9999.0  376.40                          +41
+41     NO      1.0     2.834           124.70
PBEAM   42      2       3.942   9999.0  379.30                          +42
+42     NO      1.0     2.088           112.40
PBEAM   43      2       2.886   9999.0  350.15                          +43
+43     NO      1.0     2.340           293.75
PBEAM   44      2       2.340   9999.0  293.75                          +44
+44     NO      1.0     1.430           99.875
PBEAM   45      2       1.430   9999.0  99.875          .001            +45
+45     NO      1.0     1.521           76.375
PBEAM   46      2       2.250   9999.0  215.00          .001            +46
+46     NO      1.0     2.250           162.00
PBEAM   47      2       2.250   9999.0  162.00                          +47
+47     NO      1.0     1.875           133.00
PBEAM   48      2       1.875   9999.0  133.00                          +48
+48     NO      1.0     2.250           46.00
PBEAM   49      2       1.256   1.      41.26           .001            +49
+49     NO      1.0     1.354           51.57                           +49A
+49A    0.      1.              -.1188
PBEAM   50      2       1.354   1.      51.57                           +50
+50     NO      1.0     1.371           53.59                           +50A
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PBEAM   51      2       1.371   1.      53.59                           +51
+51     NO      1.0     1.371           53.59                           +51A
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+52     NO      1.0     1.534           60.14                           +52A
+52A    0.      1.              -.0622
PBEAM   53      2       1.534   1.      60.14           .001            +53
+53     NO      1.0     1.547           62.03                           +53A
+53A    0.      1.              -.0086
PBEAM   54      2       .942    1.      37.54           .001            +54
+54     NO      1.0     1.449           76.22                           +54A
+54A    0.      1.              -.4242
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+55     NO      1.0     1980.000        9999.00                         +55A
+55A    0.      1.              .0000
PBEAM   56      2       1980.0001.      9999.00         .001            +56
+56     NO      1.0     1485.000        9999.00                         +56A
+56A    0.      1.              .0000
PBEAM   57      2       1.440   .001    .001            .001            +57
+57     NO      1.0     1.440                                           +57A
+57A    0.      1.              .0000
PBEAM   141     2       2.380   1.      46.34           .001            +141
+141    NO      1.0     2.520           52.89                           +141A
+141A   0.      1.              -.0571
PBEAM   142     2       2.520   1.      52.89           .001            +142
+142    NO      1.0     2.660           60.54                           +142A
+142A   0.      1.              -.0541
PBEAM   143     2       2.660   1.      54.50           .001            +143
+143    NO      1.0     2.800           61.49                           +143A
+143A   0.      1.              -.0513
PBEAM   144     2       2.800   1.      61.49           .001            +144
+144    NO      1.0     3.080           76.54                           +144A
+144A   0.      1.              -.0952
PBEAM   145     2       3.080   1.      76.54           .001            +145
+145    NO      1.0     3.080           76.54                           +145A
+145A   0.      1.              .0000
PBEAM   146     2       .990    1.      44.68           .001            +146
+146    NO      1.0     1.017           47.44                           +146A
+146A   0.      1.              -.0269
PBEAM   147     2       1.017   1.      34.25           .001            +147
+147    NO      1.0     1.620           103.19                          +147A
+147A   0.      1.              -.4573
PBEAM   148     2       1.500   1.      24.08           .001            +148
+148    NO      1.0     1.875           39.37                           +148A
+148A   0.      1.              -.2222
PBEAM   149     2       1.875   1.      39.37           .001            +149
+149    NO      1.0     2.250           59.52                           +149A
+149A   0.      1.              -.1818
PBEAM   150     2       1.125   1.      44.13           .001            +150
+150    NO      1.0     1.538           87.37                           +150A
+150A   0.      1.              -.3099
PBEAM   151     2       1.538   1.      86.52           .001            +151
+151    NO      1.0     1.750           115.17                          +151A
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PBEAM   152     2       1.750   1.      115.17          .001            +152
+152    NO      1.0     1.750           115.17                          +152A
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+153    NO      1.0     14.000          129.80                          +153A
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PBEAM   154     2       14.000  1.      79.18           .001            +154
+154    NO      1.0     18.000          130.90                          +154A
+154A   0.      1.              -.2500
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+160    NO      1.0     30.000                                          +160A
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+161    NO      1.0     2970.000        9999.00                         +161A
+161A   0.      1.              .0000
PBEAM   162     2       2970.0001.      9999.00         .001            +162
+162    NO      1.0     1782.000        47.10                           +162A
+162A   0.      1.              .0000
PBEAM   163     2       1.080   1.      121.33          .001            +163
+163    NO      1.0     1.080           99.73                           +163A
+163A   0.      1.              .0000
PBEAM   164     2       1980.0001.      9999.00         .001            +164
+164    NO      1.0     2970.000        9999.00                         +164A
+164A   0.      1.              .0000
PBEAM   165     2       2970.0001.      9999.00         .001            +165
+165    NO      1.0     1980.000        9999.00                         +165A
+165A   0.      1.              .0000
PBEAM   166     2       .840    1.      181.16          .001            +166
+166    NO      1.0     .678            115.24                          +166A
+166A   0.      1.              .2134
PBEAM   167     2       1980.0001.      9999.00         .001            +167
+167    NO      1.0     1980.000        9999.00                         +167A
+167A   0.      1.              .0000
PBEAM   168     2       1.400   1.      239.03          .001            +168
+168    NO      1.0     1.100           139.10                          +168A
+168A   0.      1.              .2400
PBEAM   169     2       4.200   1.      20.00           .001            +169
+169    NO      1.0     3.210           20.00                           +169A
+169A   0.      1.              .0000
PBEAM   170     2       3.210   1.      20.00           .001            +170
+170    NO      1.0     3.300           20.00                           +170A
+170A   0.      1.              .0000
PBEAM   171     2       1980.0001.      9999.00         .001            +171
+171    NO      1.0     1980.000        9999.00                         +171A
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+171A   0.      1.              .0000
PBEAM   172     2       1.230   1.      84.87                   .001            +172
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PBEAM   173     2       1.125   1.      41.92                   .001            +173
+173    NO      1.0     1.188           46.53                                   +173A
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PBEAM   174     2       .750    1.      12.63                   .001            +174
+174    NO      1.0     1.063           23.78                                   +174A
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PBEAM   175     2       1059.3001.      9999.00                 .001            +175
+175    NO      1.0     841.500         9999.00                                 +175A
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+176    NO      1.0     79.000          12.10                                   +176A
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PBEAM   177     2       79.000  1.      12.10                   .001            +177
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+178    NO      1.0     85.000          29.71                                   +178A
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PBEAM   179     2       85.000  9999.0  46.06                   .001            +179
+179    NO      1.0     90.000
PBEAM   180     2       90.000  9999.0  46.06                   .001            +180
+180    NO      1.0     55.800          31.90
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+181    NO      1.0
PBEAM   182     2       990.000 1.      9999.00                 .001            +182
+182    NO      1.0
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+1001   NO      1.      1.32951         14.209                                  +1001A
+1001A  0.      1.              1.36-2
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+1002   NO      1.      1.23648         13.640                                  +1002A
+1002A  0.      1.              7.25-2
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+1004   NO      1.      0.85176         11.727                                  +1004A
+1004A  0.      1.              .247
PBEAM   1005    2       0.85176 1.      11.727                                  +1005
+1005   NO      1.      0.57309         10.782                                  +1005A
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PBEAM   1007    2       0.5201  1.      4.137                                   +1007
+1007   NO      1.      0.5704          4.188                                   +1007A
+1007A  0.      1.              -9.23-2
PBEAM   1009    2       0.05068 1.      7.4                                     +1009
+1009   NO      1.      0.05704                                                 +1009A
+1009A  0.      1.              -.118
PBEAM   1010    2       0.68448 1.      11.387                                  +1010
+1010   NO      1.      0.65988         10.584                                  +1010A
+1010A  0.      1.              3.66-2
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+1011   NO      1.      0.58224         3.781                                   +1011A
+1011A  0.      1.              .125
PBEAM   1012    2       0.4852  1.      2.985                                   +1012
+1012   NO      1.      0.3817          3.085                                   +1012A
+1012A  0.      1.              .239
PBEAM   1013    2       0.3817  1.      4.113                                   +1013
+1013   NO      1.      0.2527          3.779                                   +1013A
+1013A  0.      1.              .407
PBEAM   1014    2       1.1795  1.      32.608                                  +1014
+1014   NO      1.      1.24325         37.764                                  +1014A
+1014A  0.      1.              -5.26-2
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+1015   NO      1.      1.26225         36.787                                  +1015A
+1015A  0.      1.              -1.52-2
PBEAM   1016    2       1.0098  1.      36.787                                  +1016
+1016   NO      1.      0.897           28.514                                  +1016A
+1016A  0.      1.              .118
PBEAM   1017    2       0.897   1.      28.514                                  +1017
+1017   NO      1.      0.7106          17.378                                  +1017A
+1017A  0.      1.              .232
PBEAM   1018    2       0.88825 1.      17.378                                  +1018
+1018   NO      1.      0.569           7.448                                   +1018A
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+1020   NO      1.      .192741         3.774                                   +1020A
+1020A  0.      1.              -.101
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+1022   NO      1.      .004701         3.                                      +1022A
+1022A  0.      1.              -.152
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+1023   NO      1.      .173225         1.931                                   +1023A
+1023A  0.      1.              .107
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+1024   NO      1.      .137473         .991                                    +1024A
+1024A  0.      1.              .230
PBEAM   1025    2       .137473 1.      .991                                    +1025
+1025   NO      1.      .085198         4.751                                   +1025A
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PBEAM   1026    2       0.53326 1.      4.915                                   +1026
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+1026A  0.      1.              -6.48-2
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+1028A  0.      1.              .225
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+1033A  0.      1.              -7.53-2
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+1034   NO      1.      .371385         8.407                                   +1034A
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PBEAM   1038    2       0.54612 1.      5.551                                   +1038
+1038   NO      1.      0.58212         5.807                                   +1038A
+1038A  0.      1.              -6.38-2
PBEAM   1039    2       0.19404 1.      4.814                                   +1039
+1039   NO      1.      0.15936         2.212                                   +1039A
+1039A  0.      1.              .196
PBEAM   1040    2       0.15936 1.      2.212                                   +1040
+1040   NO      1.      0.1296          .140                                    +1040A
+1040A  0.      1.              .206
PBEAM   1041    2       0.216   1.      .233                                    +1041
+1041   NO      1.      0.1411          .0995                                   +1041A
+1041A  0.      1.              .419
PBEAM   1043    2       .1148   1.      .239                                    +1043
+1043   NO      1.      .118531         .255                                    +1043A
+1043A  0.      1.              -3.20-2
PBEAM   1045    2       0.02716 1.      3.2                                     +1045
+1045   NO      1.      0.02891         0.119                                   +1045A
+1045A  0.      1.              -6.24-2
PBEAM   1046    2       .118531 1.      .255                                    +1046
+1046   NO      1.      .103033         .193                                    +1046A
+1046A  0.      1.              .140
PBEAM   1047    2       0.02568 1.      0.001                                   +1047
+1047   NO      1.      0.02513                                                 +1047A
+1047A  0.      1.              2.16-2
PBEAM   1048    2       .103033 1.      .193                                    +1048
+1048   NO      1.      .082328         .123                                    +1048A
+1048A  0.      1.              .223
PBEAM   1049    2       .082328 1.      .637                                    +1049
+1049   NO      1.      0.05289         .953                                    +1049A
+1049A  0.      1.              .435
PBEAM   1050    2       12.9    1.      .952                                    +1050
+1050   NO      1.      2.9             .15                                     +1050A
+1050A  0.      1.              1.266
PBEAM   1051    2       0.41616 1.      4.768                                   +1051
+1051   NO      1.      0.39888         4.214                                   +1051A
+1051A  0.      1.              4.24-2
PBEAM   1052    2       0.28808 1.      3.968                                   +1052
+1052   NO      1.      0.22399         2.323                                   +1052A
+1052A  0.      1.              .250
PBEAM   1053    2       0.22399 1.      2.323                                   +1053
+1053   NO      1.      0.13195         .877                                    +1053A
+1053A  0.      1.              .517
PBEAM   1054    2       10.15   1.      1.104                                   +1054
+1054   NO      1.      2.3             .15                                     +1054A
+1054A  0.      1.              1.261
PBEAM   1056    2       0.0772  1.      .112                                    +1056
+1056   NO      1.      .07868          .116                                    +1056A
+1056A  0.      1.              -1.90-2
PBEAM   1057    2       0.07868 1.      .116                                    +1057
+1057   NO      1.      0.06116         .0701                                   +1057A
+1057A  0.      1.              .251
PBEAM   1058    2       0.06116 1.      .587                                    +1058
+1058   NO      1.      .0332           .173                                    +1058A
+1058A  0.      1.              .593
PBEAM   1059    2       8.3     1.      .173                                    +1059
+1059   NO      1.      1.8             .15                                     +1059A
+1059A  0.      1.              1.287
PBEAM   1060    2       0.6004  1.      1.874                   3.              +1060
+1060   NO      1.      0.513           1.073                                   +1060A
+1060A  0.      1.              .157
PBEAM   1061    2       0.513   1.      1.073                   2.              +1061
+1061   NO      1.      .2508           .265                                    +1061A
+1061A  0.      1.              .687
PBEAM   1062    2       6.6     1.      .249                                    +1062
+1062   NO      1.      1.5             .15                                     +1062A
+1062A  0.      1.              1.259
PBEAM   1071    2       .563180 1.      30.125                                  +1071
+1071   NO      1.      .456388         12.840                                  +1071A
+1071A  0.      1.              .209
PBEAM   1072    2       .682631 1.      8.277                                   +1072
+1072   NO      1.      .665175         7.859                                   +1072A
+1072A  0.      1.              2.59-2
PBEAM   1073    2       .554312 1.      7.859                                   +1073
+1073   NO      1.      .515704         6.811                                   +1073A
+1073A  0.      1.              7.15-2
PBEAM   1074    2       .58975  1.      14.868                                  +1074
+1074   NO      1.      .531            6.135                                   +1074A
+1074A  0.      1.              .105
PBEAM   1075    2       .675834 1.      32.711                                  +1075
+1075   NO      1.      .608902         25.555                                  +1075A
+1075A  0.      1.              .104
PBEAM   1076    2       .74152  1.      3.66                                    +1076
+1076   NO      1.      .64649          10.312                                  +1076A
+1076A  0.      1.              .137
PBEAM   1077    2       0.59676 1.      12.691                                  +1077
+1077   NO      1.      0.50976         2.256                                   +1077A
+1077A  0.      1.              .157
PBEAM   1078    2       .531    1.      6.135                                   +1078
+1078   NO      1.      .504625         5.541                                   +1078A
+1078A  0.      1.              5.09-2
PBEAM   1079    2       0.52481 1.      5.541                                   +1079
+1079   NO      1.      0.49517         4.933                                   +1079A
+1079A  0.      1.              5.81-2
PBEAM   1080    2       0.41899 1.      4.933                                   +1080
+1080   NO      1.      0.36586         6.161                                   +1080A
+1080A  0.      1.              .135
PBEAM   1081    2       .902630 1.      30.774                                  +1081
+1081   NO      1.      .842997         31.687                                  +1081A
+1081A  0.      1.              6.83-2
PBEAM   1082    2       .756112 1.      9.525                                   +1082
+1082   NO      1.      .694238         19.190                                  +1082A
+1082A  0.      1.              8.53-2
PBEAM   1083    2       0.90882 1.      14.949                                  +1083
+1083   NO      1.      0.84618         2.210                                   +1083A
+1083A  0.      1.              7.14-2
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PBEAM   1084    2       0.9402  1.      2.762                           +1084
+1084   NO      1.      0.8128          2.065                           +1084A
+1084A  0.      1.              .145
PBEAM   1085    2       0.48768 1.      2.242                           +1085
+1085   NO      1.      0.39912         2.251                           +1085A
+1085A  0.      1.              .200
PBEAM   1086    2       0.73172 1.      4.425                           +1086
+1086   NO      1.      0.7194          4.277                           +1086A
+1086A  0.      1.              1.70-2
PBEAM   1087    2       0.7194  1.      4.277                           +1087
+1087   NO      1.      0.66748         3.682                           +1087A
+1087A  0.      1.              7.49-2
PBEAM   1088    2       0.48544 1.      3.682                           +1088
+1088   NO      1.      0.448           3.136                           +1088A
+1088A  0.      1.              8.02-2
PBEAM   1089    2       0.616   1.      3.136                           +1089
+1089   NO      1.      0.59752         2.951                           +1089A
+1089A  0.      1.              3.05-2
PBEAM   1090    2       0.59752 1.      3.319                           +1090
+1090   NO      1.      0.56496         2.968                           +1090A
+1090A  0.      1.              5.60-2
PBEAM   1091    2       .964044 1.      26.163                          +1091
+1091   NO      1.      .900046         33.946                          +1091A
+1091A  0.      1.              6.87-2
PBEAM   1092    2       .80058  1.      8.240                           +1092
+1092   NO      1.      .740025         7.040                           +1092A
+1092A  0.      1.              7.86-2
PBEAM   1093    2       0.9867  1.      3.017                           +1093
+1093   NO      1.      0.9295          2.678                           +1093A
+1093A  0.      1.              5.97-2
PBEAM   1094    2       0.7605  1.      2.231                           +1094
+1094   NO      1.      0.70344         1.909                           +1094A
+1094A  0.      1.              7.80-2
PBEAM   1095    2       0.62528 1.      2.245                           +1095
+1095   NO      1.      0.56416         5.554                           +1095A
+1095A  0.      1.              .103
PBEAM   1096    2       1.12832 1.      3.720                           +1096
+1096   NO      1.      1.03488         3.138                           +1096A
+1096A  0.      1.              8.64-2
PBEAM   1097    2       0.58212 1.      .9936                           +1097
+1097   NO      1.      0.52038         .794                            +1097A
+1097A  0.      1.              .112
PBEAM   1098    2       0.46256 1.      .878                            +1098
+1098   NO      1.      0.41088         .692                            +1098A
+1098A  0.      1.              .118
PBEAM   1099    2       0.56496 1.      2.968                           +1099
+1099   NO      1.      0.50864         3.405                           +1099A
+1099A  0.      1.              .105
PBEAM   1100    2       0.32368 1.      2.951                           +1100
+1100   NO      1.      0.2702          1.360                           +1100A
+1100A  0.      1.              .180
PBEAM   1101    2       0.2895  1.      1.434                           +1101
+1101   NO      1.      0.237           1.561                           +1101A
+1101A  0.      1.              .199
PBEAM   1102    2       .803494 1.      19.105                          +1102
+1102   NO      1.      .756148         18.318                          +1102A
+1102A  0.      1.              6.07-2
PBEAM   1103    2       .868368 1.      3.7                             +1103
+1103   NO      1.      .808308         3.656                           +1103A
+1103A  0.      1.              7.16-2
PBEAM   1104    2       0.56848 1.      7.616                           +1104
+1104   NO      1.      0.53648         2.977                           +1104A
+1104A  0.      1.              5.79-2
PBEAM   1105    2       0.53648 1.      1.985                           +1105
+1105   NO      1.      0.49888         2.015                           +1105A
+1105A  0.      1.              7.26-2
PBEAM   1106    2       0.49888 1.      2.217                           +1106
+1106   NO      1.      0.4536          2.014                           +1106A
+1106A  0.      1.              9.51-2
PBEAM   1107    2       0.70875 1.      2.009                           +1107
+1107   NO      1.      0.664           1.764                           +1107A
+1107A  0.      1.              6.52-2
PBEAM   1108    2       0.3984  1.      .670                            +1108
+1108   NO      1.      0.37695         .600                            +1108A
+1108A  0.      1.              5.53-2
PBEAM   1109    2       0.37695 1.      .600                            +1109
+1109   NO      1.      0.3324          1.367                           +1109A
+1109A  0.      1.              .126
PBEAM   1110    2       0.35456 1.      1.367                           +1110
+1110   NO      1.      0.31472         .368                            +1110A
+1110A  0.      1.              .119
PBEAM   1111    2       0.15736 1.      .242                            +1111
+1111   NO      1.      0.1264          1.156                           +1111A
+1111A  0.      1.              .218
PBEAM   1112    2       0.1728  1.      .303                            +1112
+1112   NO      1.      0.16064         .262                            +1112A
+1112A  0.      1.              7.29-2
PBEAM   1113    2       0.16064 1.      .222                            +1113
+1113   NO      1.      0.13784         .163                            +1113A
+1113A  0.      1.              .153
PBEAM   1114    2       0.13784 1.      .148                            +1114
+1114   NO      1.      0.12232         .117                            +1114A
+1114A  0.      1.              .119
PBEAM   1115    2       0.12232 1.      .117                            +1115
+1115   NO      1.      0.108           .991                            +1115A
+1115A  0.      1.              .124
PBEAM   1116    2       .337714 1.      19.909                          +1116
+1116   NO      1.      .312716         19.868                          +1116A
+1116A  0.      1.              7.69-2
PBEAM   1117    2       0.85918 1.      3.590                           +1117
+1117   NO      1.      0.77384         3.626                           +1117A
+1117A  0.      1.              .105
PBEAM   1118    2       0.54624 1.      6.20                            +1118
+1118   NO      1.      0.49872         2.937                           +1118A
+1118A  0.      1.              9.10-2
PBEAM   1119    2       0.39482 1.      1.371                           +1119
+1119   NO      1.      0.35112         1.197                           +1119A
+1119A  0.      1.              .117
PBEAM   1120    2       0.31416 1.      1.796                           +1120
+1120   NO      1.      0.27047         1.622                           +1120A
+1120A  0.      1.              .149
PBEAM   1121    2       0.36593 1.      .570                            +1121
+1121   NO      1.      0.32453         .448                            +1121A
+1121A  0.      1.              .120
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PBEAM   1122    2       0.23987 1.      .388                            +1122
+1122   NO      1.      0.2193          .324                            +1122A
+1122A  0.      1.              8.96-2
PBEAM   1123    2       2.193   1.      0.577                           +1123
+1123   NO      1.      1.7255          0.319                           +1123A
+1123A  0.      1.              .239
PBEAM   1124    2       1.7255  .1      0.319                           +1124
+1124   NO      1.      1.411           0.186                           +1124A
+1124A  0.      1.              .201
PBEAM   1125    2       1.411   1.      0.186                           +1125
+1125   NO      1.      1.122           0.37                            +1125A
+1125A  0.      1.              .228
PBEAM   1126    2       0.290   1.      .15                             +1126
+1126   NO      1.      0.230                                           +1126A
+1126A  0.      1.              .231
PBEAM   1127    2       0.230   1.      .15                             +1127
+1127   NO      1.      0.180                                           +1127A
+1127A  0.      1.              .244
PBEAM   1128    2       0.180   1.      .15                             +1128
+1128   NO      1.      0.150                                           +1128A
+1128A  0.      1.              .182
PBEAM   1131    2       24.900  1.      2.334                           +1131
+1131   NO      1.0     41.600          4.497                           +1131A
+1131A  0.      1.              -.502
PBEAM   1132    2       22.300  1.      1.258                           +1132
+1132   NO      1.0     43.800          6.091                           +1132A
+1132A  0.      1.              -.651
PBEAM   1133    2       43.800  1.      6.091           .001            +1133
+1133   NO      1.0     46.400          8.843                           +1133A
+1133A  0.      1.              -.058
PBEAM   1134    2       46.4    100.    13.5            10.             +1134
+1134   NO      1.      50.68                                           +1134A
+1134A  0.      1.              -8.82-2
PBEAM   1135    2       20.300  1.      1.601                           +1135
+1135   NO      1.0     39.600          5.214                           +1135A
+1135A  0.      1.              -.644
PBEAM   1136    2       17.900  1.      1.469                           +1136
+1136   NO      1.0     35.300          4.849                           +1136A
+1136A  0.      1.              -.654
PBEAM   1137    2       35.300  1.      4.849           .001            +1137
+1137   NO      1.0     39.910          7.360                           +1137A
+1137A  0.      1.              -.123
PBEAM   1138    2       39.91   100.    10.5            10.             +1138
+1138   NO      1.      40.37                                           +1138A
+1138A  0.      1.              -1.15-2
PBEAM   1139    2       15.900  1.      1.286                           +1139
+1139   NO      1.0     31.800          4.283                           +1139A
+1139A  0.      1.              -.667
PBEAM   1140    2       14.000  1.      .836                            +1140
+1140   NO      1.0     28.200          2.827                           +1140A
+1140A  0.      1.              -.673
PBEAM   1141    2       28.200  1.      2.827           .001            +1141
+1141   NO      1.0     32.160          4.634                           +1141A
+1141A  0.      1.              -.131
PBEAM   1142    2       32.16   100.    7.94            10.             +1142
+1142   NO      1.      32.70                                           +1142A
+1142A  0.      1.              -1.67-2
PBEAM   1143    2       12.800  1.      .537                            +1143
+1143   NO      1.0     26.050          1.860                           +1143A
+1143A  0.      1.              -.682
PBEAM   1144    2       11.190  1.      .541                            +1144
+1144   NO      1.0     23.000          1.894                           +1144A
+1144A  0.      1.              -.691
PBEAM   1145    2       23.000  1.      1.894           .001            +1145
+1145   NO      1.0     25.560          3.414                           +1145A
+1145A  0.      1.              -.105
PBEAM   1146    2       25.56   100.    6.5             10.             +1146
+1146   NO      1.      27.16                                           +1146A
+1146A  0.      1.              -6.070-2
PBEAM   1147    2       9.060   1.      .492                            +1147
+1147   NO      1.0     19.800          1.700                           +1147A
+1147A  0.      1.              -.744
PBEAM   1148    2       7.640   1.      .210                            +1148
+1148   NO      1.0     17.500          .929                            +1148A
+1148A  0.      1.              -.784
PBEAM   1149    2       17.500  1.      .929            .001            +1149
+1149   NO      1.0     18.620          1.942                           +1149A
+1149A  0.      1.              -.062
PBEAM   1150    2       18.62   100.    4.32            10.             +1150
+1150   NO      1.      19.3                                            +1150A
+1150A  0.      1.              -3.59-2
PBEAM   1151    2       7.100   1.      .042                            +1151
+1151   NO      1.0     16.900          .269                            +1151A
+1151A  0.      1.              -.817
PBEAM   1152    2       22.300  1.      1.150                           +1152
+1152   NO      1.0     24.900          1.440                           +1152A
+1152A  0.      1.              -.110
PBEAM   1153    2       20.300  1.      .870                            +1153
+1153   NO      1.0     22.300          1.150                           +1153A
+1153A  0.      1.              -.094
PBEAM   1154    2       17.900  1.      .630                            +1154
+1154   NO      1.0     20.300          .870                            +1154A
+1154A  0.      1.              -.126
PBEAM   1155    2       15.900  1.      .470                            +1155
+1155   NO      1.0     17.900          .630                            +1155A
+1155A  0.      1.              -.118
PBEAM   1156    2       14.000  1.      .340                            +1156
+1156   NO      1.0     15.900          .470                            +1156A
+1156A  0.      1.              -.127
PBEAM   1157    2       12.800  1.      .260                            +1157
+1157   NO      1.0     14.000          .340                            +1157A
+1157A  0.      1.              -.090
PBEAM   1158    2       11.190  1.      .280                            +1158
+1158   NO      1.0     12.800          .260                            +1158A
+1158A  0.      1.              -.134
PBEAM   1159    2       9.060   1.      .260                            +1159
+1159   NO      1.0     11.190          .280                            +1159A
+1159A  0.      1.              -.210
PBEAM   1160    2       7.640   1.      .170                            +1160
+1160   NO      1.0     9.060           .260                            +1160A
+1160A  0.      1.              -.170
PBEAM   1161    2       7.100   1.      .120                            +1161
+1161   NO      1.0     7.640           .170                            +1161A
+1161A  0.      1.              -.073
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PBEAM   1162    2       43.800  1.      5.189                           +1162
+1162   NO      1.0     41.600          5.636                           +1162A
+1162A  0.      1.              .052
PBEAM   1163    2       39.600  1.      4.049                           +1163
+1163   NO      1.0     43.800          5.170                           +1163A
+1163A  0.      1.              -.101
PBEAM   1164    2       35.300  1.      3.053                           +1164
+1164   NO      1.0     39.600          4.049                           +1164A
+1164A  0.      1.              -.115
PBEAM   1165    2       31.800  1.      2.364                           +1165
+1165   NO      1.0     35.300          3.040                           +1165A
+1165A  0.      1.              -.104
PBEAM   1166    2       28.200  1.      1.762                           +1166
+1166   NO      1.0     31.800          2.354                           +1166A
+1166A  0.      1.              -.120
PBEAM   1167    2       26.050  1.      1.444                           +1167
+1167   NO      1.0     28.200          1.754                           +1167A
+1167A  0.      1.              -.079
PBEAM   1168    2       23.000  1.      1.274                           +1168
+1168   NO      1.0     26.050          1.431                           +1168A
+1168A  0.      1.              -.124
PBEAM   1169    2       19.800  1.      1.019                           +1169
+1169   NO      1.0     23.000          1.269                           +1169A
+1169A  0.      1.              -.150
PBEAM   1170    2       17.500  1.      .706                            +1170
+1170   NO      1.0     19.800          1.007                           +1170A
+1170A  0.      1.              -.123
PBEAM   1171    2       16.900  1.      .588                            +1171
+1171   NO      1.0     17.500          .709                            +1171A
+1171A  0.      1.              -.035
PBEAM   1181    2       0.341   100.    4.328           .001            +1181
+1181   NO      1.      1.0025          10.953                          +1181A
+1181A  0.      1.              -.984
PBEAM   1182    2       1.604   1.      75.00000        .265            +1182
+1182   NO      1.0     1.365           70.00000                        +1182A
+1182A  0.      1.              .1611
PBEAM   1183    2       68.240  1.      70.00000        .265            +1183
+1183   NO      1.0     53.180          18.30000                        +1183A
+1183A  0.      1.              .2481
PBEAM   1184    2       1.064   1.      18.30000        .265            +1184
+1184   NO      1.0     .715            5.30000                         +1184A
+1184A  0.      1.              .3923
PBEAM   1185    2       .715    1.      5.30000         .265            +1185
+1185   NO      1.0     .370            .65000                          +1185A
+1185A  0.      1.              .6362
PBEAM   1186    2       22.130  1.      7.00000         .265            +1186
+1186   NO      1.0     21.000          7.00000                         +1186A
+1186A  0.      1.              .0524
PBEAM   1187    2       21.000  1.      7.00000         .265            +1187
+1187   NO      1.0     16.200          .95000                          +1187A
+1187A  0.      1.              .2581
PBEAM   1188    2       16.200  1.      .95000          .265            +1188
+1188   NO      1.0     10.900          .30000                          +1188A
+1188A  0.      1.              .3911
PBEAM   1189    2       10.900  1.      .30000          .265            +1189
+1189   NO      1.0     5.690           .04000                          +1189A
+1189A  0.      1.              .6281
PBEAM   1190    2       3.414   100.    1.1             .001            +1190
+1190   NO      1.      2.802           1.0                             +1190A
+1190A  0.      1.              .197
PBEAM   1191    2       18.680  1.      5.80000         .265            +1191
+1191   NO      1.0     18.680          5.80000                         +1191A
+1191A  0.      1.              .0000
PBEAM   1192    2       18.680  1.      5.80000         .265            +1192
+1192   NO      1.0     14.740          .28300                          +1192A
+1192A  0.      1.              .2358
PBEAM   1193    2       14.740  1.      .28300          .265            +1193
+1193   NO      1.0     9.990           .09600                          +1193A
+1193A  0.      1.              .3841
PBEAM   1194    2       9.990   1.      .09600          .265            +1194
+1194   NO      1.0     5.250           .01400                          +1194A
+1194A  0.      1.              .6220
PBEAM   1195    2       35.960  1.      5.14100         .265            +1195
+1195   NO      1.0     33.740          5.13000                         +1195A
+1195A  0.      1.              .0637
PBEAM   1196    2       33.740  1.      5.13000         .265            +1196
+1196   NO      1.0     26.740          .22400                          +1196A
+1196A  0.      1.              .2315
PBEAM   1197    2       26.740  1.      .22400          .265            +1197
+1197   NO      1.0     18.100          .07510                          +1197A
+1197A  0.      1.              .3854
PBEAM   1198    2       18.100  1.      .07510          .265            +1198
+1198   NO      1.0     9.500           .01143                          +1198A
+1198A  0.      1.              .6232
PBEAM   1199    2       0.924   100.    0.32            .001            +1199
+1199   NO      1.      0.7535          0.25                            +1199A
+1199A  0.      1.              .203
PBEAM   1200    2       15.070  1.      3.20000         .265            +1200
+1200   NO      1.0     15.070          3.20000                         +1200A
+1200A  0.      1.              .0000
PBEAM   1201    2       15.070  1.      3.20000         .265            +1201
+1201   NO      1.0     13.370          .17300                          +1201A
+1201A  0.      1.              .1195
PBEAM   1202    2       13.370  1.      .17300          .265            +1202
+1202   NO      1.0     8.120           .05600                          +1202A
+1202A  0.      1.              .4886
PBEAM   1203    2       8.120   1.      .05600          .265            +1203
+1203   NO      1.0     4.260           .00880                          +1203A
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PBEAM   1204    2       15.940  1.      2.00000         .265            +1204
+1204   NO      1.0     13.940          2.00000                         +1204A
+1204A  0.      1.              .1339
PBEAM   1205    2       13.940  1.      2.00000         .265            +1205
+1205   NO      1.0     11.130          .10800                          +1205A
+1205A  0.      1.              .2242
PBEAM   1206    2       11.130  1.      .10800          .265            +1206
+1206   NO      1.0     7.530           .03700                          +1206A
+1206A  0.      1.              .3859
PBEAM   1207    2       7.530   1.      .03700          .265            +1207
+1207   NO      1.0     3.950           .00580                          +1207A
+1207A  0.      1.              .6237
PBEAM   1208    2       12.820  1.      1.20000         .265            +1208
+1208   NO      1.0     12.820          1.20000                         +1208A
+1208A  0.      1.              .0000
PBEAM   1209    2       12.820  1.      1.20000         .265            +1209
+1209   NO      1.0     10.280          .07100                          +1209A
+1209A  0.      1.              .2199
PBEAM   1210    2       10.280  1.      .07100          .265            +1210
+1210   NO      1.0     6.960           .02500                          +1210A
+1210A  0.      1.              .3852
PBEAM   1211    2       6.960   1.      .02500          .265            +1211
+1211   NO      1.0     3.640           .00370                          +1211A
+1211A  0.      1.              .6264
PBEAM   1212    2       0.7055  100.    0.32            .001            +1212
+1212   NO      1.      0.63            0.25                            +1212A
+1212A  0.      1.              .113
PBEAM   1213    2       12.600  1.      .70000          .265            +1213
+1213   NO      1.0     11.690          .70000                          +1213A
+1213A  0.      1.              .0749
PBEAM   1214    2       11.690  1.      .70000          .265            +1214
+1214   NO      1.0     9.420           .05530                          +1214A
+1214A  0.      1.              .2151
PBEAM   1215    2       9.420   1.      .05530          .265            +1215
+1215   NO      1.0     6.360           .01900                          +1215A
+1215A  0.      1.              .3878
PBEAM   1216    2       6.360   1.      .01900          .265            +1216
+1216   NO      1.0     3.330           .00290                          +1216A
+1216A  0.      1.              .6254
PBEAM   1217    2       11.400  1.      .40000          .265            +1217
+1217   NO      1.0     10.620          .40000                          +1217A
+1217A  0.      1.              .0708
PBEAM   1218    2       10.620  1.      .40000          .265            +1218
+1218   NO      1.0     8.570           .01970                          +1218A
+1218A  0.      1.              .2137
PBEAM   1219    2       8.570   1.      .01970          .265            +1219
+1219   NO      1.0     5.750           .00760                          +1219A
+1219A  0.      1.              .3939
PBEAM   1220    2       5.750   1.      .00760          .265            +1220
+1220   NO      1.0     2.990           .00130                          +1220A
+1220A  0.      1.              .6316
PBEAM   1231    2       .189    1.      2.20872         3.000           +1231
+1231   NO      1.0     .614            25.02095                        +1231A
+1231A  0.      1.              -1.0587
PBEAM   1232    2       .280    1.      1.74280         2.000           +1232
+1232   NO      1.0     .315            2.20872                         +1232A
+1232A  0.      1.              -.1169
PBEAM   1233    2       .152    1.      1.15839         .900            +1233
+1233   NO      1.0     .168            1.42177                         +1233A
+1233A  0.      1.              -.1018
PBEAM   1234    2       .226    1.      .74641          .700            +1234
+1234   NO      1.0     .253            .93783                          +1234A
+1234A  0.      1.              -.1127
PBEAM   1235    2       .125    1.      .55802          .400            +1235
+1235   NO      1.0     .136            .65330                          +1235A
+1235A  0.      1.              -.0779
PBEAM   1236    2       .115    1.      .40738          .300            +1236
+1236   NO      1.0     .125            .48321                          +1236A
+1236A  0.      1.              -.0837
PBEAM   1237    2       .175    1.      .28956          .150            +1237
+1237   NO      1.0     .192            .34903                          +1237A
+1237A  0.      1.              -.0922
PBEAM   1238    2       .096    1.      .20137          .075            +1238
+1238   NO      1.0     .105            .24515                          +1238A
+1238A  0.      1.              -.0959
PBEAM   1241    2       16.200  1.      .01850          3.000           +1241
+1241   NO      1.0     53.180          .26000                          +1241A
+1241A  0.      1.              -1.0660
PBEAM   1242    2       14.740  1.      .01400          2.000           +1242
+1242   NO      1.0     16.200          .01850                          +1242A
+1242A  0.      1.              -.0944
PBEAM   1243    2       13.370  1.      .00940          .900            +1243
+1243   NO      1.0     14.740          .01400                          +1243A
+1243A  0.      1.              -.0975
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+1244   NO      1.0     13.370          .00940                          +1244A
+1244A  0.      1.              .0000
PBEAM   1245    2       11.130  1.      .00450          .400            +1245
+1245   NO      1.0     13.370          .00690                          +1245A
+1245A  0.      1.              -.1829
PBEAM   1246    2       10.280  1.      .00330          .300            +1246
+1246   NO      1.0     11.130          .00450                          +1246A
+1246A  0.      1.              -.0794
PBEAM   1247    2       9.420   1.      .00210          .150            +1247
+1247   NO      1.0     10.280          .00330                          +1247A
+1247A  0.      1.              -.0873
PBEAM   1248    2       8.570   1.      .00150          .075            +1248
+1248   NO      1.0     9.420           .00210                          +1248A
+1248A  0.      1.              -.0945
PBEAM   1251    2       10.900  1.      .00604          3.000           +1251
+1251   NO      1.0     35.740          .08200                          +1251A
+1251A  0.      1.              -1.0652
PBEAM   1252    2       9.990   1.      .00460          2.000           +1252
+1252   NO      1.0     10.900          .00604                          +1252A
+1252A  0.      1.              -.0871
PBEAM   1253    2       9.050   1.      .00315          .900            +1253
+1253   NO      1.0     9.990           .00460                          +1253A
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PBEAM   1254    2       8.120   1.      .00232          .700            +1254
+1254   NO      1.0     9.050           .00315                          +1254A
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PBEAM   1255    2       7.530   1.      .00149          .400            +1255
+1255   NO      1.0     8.120           .00232                          +1255A
+1255A  0.      1.              -.0754
PBEAM   1256    2       6.960   1.      .00112          .300            +1256
+1256   NO      1.0     7.530           .00149                          +1256A
+1256A  0.      1.              -.0787
PBEAM   1257    2       6.360   1.      .00074          .150            +1257
+1257   NO      1.0     6.960           .00112                          +1257A
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PBEAM   1258    2       5.750   1.      .00049          .075            +1258
+1258   NO      1.0     6.360           .00074                          +1258A
+1258A  0.      1.              -.1007
PBEAM   1261    2       5.690   1.      .00089          3.000           +1261
+1261   NO      1.0     18.490          .01210                          +1261A
+1261A  0.      1.              -1.0587
PBEAM   1262    2       5.250   1.      .00068          2.000           +1262
+1262   NO      1.0     5.690           .00089                          +1262A
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PBEAM   1264    2       4.260   1.      .00035          .700            +1264
+1264   NO      1.0     4.750           .00047                          +1264A
+1264A  0.      1.              -.1088
PBEAM   1265    2       3.950   1.      .00023          .400            +1265
+1265   NO      1.0     4.260           .00035                          +1265A
+1265A  0.      1.              -.0755
PBEAM   1266    2       3.640   1.      .00017          .300            +1266
+1266   NO      1.0     3.950           .00023                          +1266A
+1266A  0.      1.              -.0817
PBEAM   1267    2       3.330   1.      .00011          .150            +1267
+1267   NO      1.0     3.640           .00017                          +1267A
+1267A  0.      1.              -.0890
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+1268   NO      1.0     3.330           .00011                          +1268A
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+2002   NO      1.      5574.4201.      37.000
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+2003   NO      1.      3618.9001.      18.660
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+2004   NO      1.      1663.3351.      .320
PBEAM   2005    2       1429.5691.      1.290           .001            +2005
+2005   NO      1.      3214.8001.      10.645
PBEAM   2006    2       3214.8001.      10.645          .001            +2006
+2006   NO      1.      4999.9951.      20.000
PBEAM   2007    2       4999.9951.      20.000          .001            +2007
+2007   NO      1.      3331.6651.      11.600
PBEAM   2008    2       3331.6651.      11.600          .001            +2008
+2008   NO      1.      1663.3351.      3.200
PBEAM   2009    2       1117.8811.      .770            .001            +2009
+2009   NO      1.      2357.6401.      .485
PBEAM   2010    2       2357.6401.      .485            .001            +2010
+2010   NO      1.      3597.3991.      .200
PBEAM   2011    2       3597.3991.      .200            .001            +2011
+2011   NO      1.      2467.5301.      .650
PBEAM   2012    2       2467.5301.      .650            .001            +2012
+2012   NO      1.      1337.6611.      1.100
PBEAM   2013    2       859.140 1.      .294            .001            +2013
+2013   NO      1.      1864.8001.      .247
PBEAM   2014    2       1864.8001.      .247            .001            +2014
+2014   NO      1.      2870.5271.      .200
PBEAM   2015    2       2870.5271.      .200            .001            +2015
+2015   NO      1.      1965.2331.      .470
PBEAM   2016    2       1965.2331.      .470            .001            +2016
+2016   NO      1.      1059.9391.      .740
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+2017   NO      1.      1398.2001.      .104
PBEAM   2018    2       1398.2001.      .104            .001            +2018
+2018   NO      1.      2178.8191.      .100
PBEAM   2019    2       2178.8191.      .100            .001            +2019
+2019   NO      1.      1488.0001.      .120
PBEAM   2020    2       1488.0001.      .120            .001            +2020
+2020   NO      1.      797.200 1.      .140
PBEAM   2021    2       454.845 1.      .100            .001            +2021
+2021   NO      1.      832.800 1.      .110
PBEAM   2022    2       832.800 1.      .110            .001            +2022
+2022   NO      1.      1210.7881.      .120
PBEAM   2023    2       1210.7881.      .120            .001            +2023
+2023   NO      1.      852.600 1.      .126
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+2032   NO      1.      142.957 1.      1.740
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PBEAM   2036    2       98.900  1.      .714            .001            +2036
+2036   NO      1.      85.914  1.      .490
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+2039   NO      1.      53.600  1.      .205
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PBEAM   2041    2       557.442 1.      61.000          .001            +2041
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+2047   NO      1.      252.500 1.      .860
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+2056   NO      1.      79.720  1.      .350
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+2057   NO      1.      64.600  1.      .204
PBEAM   2058    2       64.600  1.      .204            .001            +2058
+2058   NO      1.      49.451  1.      .099
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+3026P  NO      1.      4.92                                            +3026PA
+3026PA 0.      1.              -0.887
PBEAM   3027    2       0.3     1000.   10.             .001            +3027P
+3027P  NO      1.      0.123                                           +3027PA
+3027PA 0.      1.              0.837
PBEAM   3028    2       22.     1000.   10.             .001            +3028P
+3028P  NO      1.      41.                                             +3028PA
+3028PA 0.      1.              -0.603
PBEAM   3029    2       22.     1000.   10.             .001            +3029P
+3029P  NO      1.
PBEAM   3030    2       41.     1000.   10.             .001            +3030P
+3030P  NO      1.
PBEAM   3031    2       41.     1000.   10.             .001            +3031P
+3031P  NO      1.
PBEAM   3032    2       41.     1000.   10.             0.              +3032P
+3032P  NO      1.
PBEAM   3081    2       23.11   999.    .01             .01             +3081P
+3081P  NO      1.      100.                                            +3081PA
+3081PA                 -1.249
PBEAM   3082    2       100.    999.    .01             .01             +3082P
+3082P  NO      1.      22.11                                           +3082PA
+3082PA                 1.276
PBEAM   3083    2       100.    999.    .01             .01             +3083P
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+3083PA 1.      .001
PBEAM   3085    2       100.    999.    .01             .01             +3085P
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+3085PA 1.      .001
PBEAM   3087    2       22.     .001    26.89           .001            +3087P
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PBEAM   3088    2       22.     .001    999.            .001            +3088P
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+3089P  NO      1.                                                      +3089PA
+3089PA .001    1.
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+3090P  NO      1.      .726                                            +3090PA
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RBAR	2281	524	1524	123456	123
RBAR	2282	524	2524	123456	123
RBAR	2283	525	1525	123456	123
RBAR	2284	525	2525	123456	123
RBAR	2285	526	1526	123456	123
RBAR	2286	526	2526	123456	123
RBAR	3042	72	3016	123456	
RBAR	3043	3016	143	123456	123
RBAR	3107	3047	21	123456	15
RBAR	3108	3047	61	123456	15
RBAR	3109	3053	3063	123456	123
RBAR	3110	3055	3064	123456	123

```
RBAR    3111    3047    3065    123456                  123
RBAR    3112    3048    3066    123456                  123
RBAR    3113    3053    3067    123456                  123
RBAR    3114    3055    3068    123456                  123
RBAR    3115    3047    3069    123456                  123
RBAR    3116    3048    3070    123456                  123
RBAR    3419    3203    182     123456                  123
RBAR    3420    3203    183     123456                  123
RBAR    3421    3205    185     123456                  123
RBAR    3422    3205    186     123456                  123
RBAR    3423    3201    3204    123456                  5
RBAR    3424    3204    3207    123456                  3
RBAR    3425    3208    3212    123456                  3
RBAR    3426    3208    3209    123456                  123
SPC1    3       1       359     360     361     362     364     367
SPC1    3       1       368     369     370     371     373     381
SPC1    3       1       383     384     385     386     387     389
SPC1    3       1       390     391     392     393     408
SPC1    3       156     36      42      50      437     59      431
SPC1    3       156     71      84      298     286     117     285
SPC1    3       156     163     164     153     154     155     156
SPC1    3       156     267     268     458     459
SPC1    3       156     283     284     282     281     405
SPC1    4       234     36      42      50      437     59      431
SPC1    4       234     71      84      298     286     117     285
SPC1    4       234     163     164     153     154     155     156
SPC1    4       234     267     268     458     459
SPC1    4       234     283     284     282     281     405
SPC1    5       4       3022
SPC1    5       4       3047
SPC1    5       456     251     256     261     262     266
SPC1    5       456     1001    1002    1003    1004    1005    1006
SPC1    5       456     1007    1008    1010    1012    1014    1016
SPC1    5       456     1018    1173    1174    1175    1176    1177
SPC1    5       456     1019    THRU    1027
SPC1    5       456     1029    1030    1032    1033    1038    1039
SPC1    5       456     1031    1034    1037    1040    1045    1048
SPC1    5       456     1044    1046    1047    1051    1052    1053
SPC1    5       456     1054    1057    1066    1069    1079    1082
SPC1    5       456     1055    1056    1060    1061    1062    1063
SPC1    5       456     1064    1065    1067    1068    1072    1073
SPC1    5       456     1074    1075    1076    1077    1078    1080
SPC1    5       456     1079    1114    1275    1276    1280    1290
SPC1    5       456     1081    1085    1086    1087    1088
SPC1    5       456     1094    1114    1121
SPC1    5       456     1096    1097    1098    1099    1100    1101
SPC1    5       456     1102    1103    1104    1105    1106    1107
SPC1    5       456     1108    1109    1110    1111    1112    1113
SPC1    5       456     1125    1126    1127
SPC1    5       456     1128    1129    1130    1131    1132    1133
SPC1    5       456     1134    1135    1136    1137    1138    1139
SPC1    5       456     1140    1141    1142
SPC1    5       456     1143
SPC1    5       456     1178    1179    1180    1194
SPC1    5       456     1181    THRU    1193
SPC1    5       456     1233    2233
SPC1    5       456     1242    1243    1244    1245
SPC1    5       456     1251    THRU    1266
SPC1    5       456     1292    1293    1464    1465    1466    1467
SPC1    5       456     1501    THRU    1526
SPC1    5       456     2001    2002    2003    2004    2005    2006
SPC1    5       456     2007    2008    2010    2012    2014    2016
SPC1    5       456     2018    2173    2174    2175    2176    2177
SPC1    5       456     2019    THRU    2027
SPC1    5       456     2029    2030    2032    2033    2038    2039
SPC1    5       456     2031    2034    2037    2040    2045    2048
SPC1    5       456     2044    2046    2047    2051    2052    2053
SPC1    5       456     2054    2057    2066    2069    2079    2082
SPC1    5       456     2055    2056    2060    2061    2062    2063
SPC1    5       456     2064    2065    2067    2068    2072    2073
SPC1    5       456     2074    2075    2076    2077    2078    2080
SPC1    5       456     2079    2114    2275    2276    2280    2290
SPC1    5       456     2081    2085    2086    2087    2088
SPC1    5       456     2094    2114    2121
SPC1    5       456     2096    2097    2098    2099    2100    2101
SPC1    5       456     2102    2103    2104    2105    2106    2107
SPC1    5       456     2108    2109    2110    2111    2112    2113
SPC1    5       456     2125    2126    2127
SPC1    5       456     2128    2129    2130    2131    2132    2133
SPC1    5       456     2134    2135    2136    2137    2138    2139
SPC1    5       456     2140    2141    2142
SPC1    5       456     2143
SPC1    5       456     2178    2179    2180    2194
SPC1    5       456     2181    THRU    2193
SPC1    5       456     2242    2243    2244    2245
SPC1    5       456     2251    THRU    2266
SPC1    5       456     2292    2293    2464    2465    2466    2467
SPC1    5       456     2501    THRU    2526
SPC1    5       456     3063    3064    3065    3066
SPC1    5       456     3067    3068    3069    3070
SPC1    5       123456  701     702     703
SPCADD  1       3       5
SPCADD  2       4       5
SUPORT  42      156
ENDDATA
```

Appendix C.
Structural Finite Element Data for Nontypical LCO Case

```
ID LMTAS BLOCK 40 F-16 FLUTTER FEM NONTYPICAL LCO CASE
SOL 103
TIME 20
$
CEND
$
TITLE=F-16 1/2 AIRPLANE FINITE ELEMENT MODEL FOR FLUTTER ANALYSIS
SUBTI=ANTI-SYMMETRIC CENTERLINE BOUNDARY CONDITIONS // FULL XWING FUEL
LABEL=CONFIG 5 = MA41
DISP=ALL
ECHO=SORT
$ DMIG VERTICAL TAIL STIFFNESS MATRIX
K2GG=VTAIL
$ EIGENVALUE EXTRACTION
METHOD=1
$ SYMMETRIC B.C. / SPC=2 FOR ANTISYMMETRIC
SPC=2
$
$ SET 203022=GRIDS USED IN FLUTTER ANALYSIS.
$ ADD GRIDS 801 THROUGH 814 FOR DYNAMIC RESPONSE.
$
SET 203022=   2,   3,   4,   5,   6,
              9,  11,  13,  15,  17,
             19,  20,  21,  26,  29,
             33,  39,  44,  47,  51,
             52,  53,  56,  60,  61,
             62,  64,  65,  68,  72,
             73,  74,  75,  77,  78,
             81,  85,  86,  87,  89,
             90,  91,  92,  93,  95,
            102, 103, 104, 105, 106,
            107, 108, 109, 110, 111,
            112, 113, 122, 123, 124,
            128, 129, 130, 131, 132,
            133,3004,3006,3009          $ AIM-9/16S200 OR 16S200 ON TIP
$
$ GENERATE BUT DO NOT PRINT-
$  EIGENVECTORS FOR FLUTTER ANALYSIS
$
$ PRINT-
$ A-SET EIGENVECTORS FOR INSPECTION
$
OUTPUT(PLOT)
CSCALE=1.8
PAPER SIZE=26. BY 20.
$
$ SET 10=ELEMENTS USED IN MODE PLOTS
$
$ FUSELAGE CENTERLINE
SET 10=   1 THRU   26,
$ WING BOX
       1001 THRU 1005,
       1007,1010 THRU 1013,
       1020,1023 THRU 1025,
       1031,1034,1036,1043,1045,
       1046,1048 THRU 1054,
       1056 THRU 1062,
       1071 THRU 1074,
       1078,1079,1080,
       1086 THRU 1090,
       1099,1100,1101,
       1075,1076,1077,
       1081 THRU 1085,
       1091 THRU 1097,
       1102 THRU 1111,
       1116 THRU 1125,
       1126,1127,1128,
$ LEADING EDGE FLAP / 1258 ACTUATOR
       1131 THRU 1134,
       1136,1137,1138,
       1140,1141,1142,
       1144,1145,1146,
       1148 THRU 1151,
       1152 THRU 1171,
$ FLAPERON
       1181 THRU 1185,
       1187 THRU 1189,
       1190 THRU 1194,
       1196 THRU 1203,
       1205 THRU 1207,
       1209 THRU 1220,
       1231 THRU 1238,
       1251 THRU 1258,
       1261 THRU 1268,
$ HORIZONTAL TAIL
       2001 THRU 2058,
$ VERTICAL TAIL
       2401 THRU 2460,
$ 16S200 // STATION 1,9
       3003 THRU 3009,
$ AIM-9L // STATION 1,9
       3014,3015
$
MAXIMUM DEFORMATION 35.
AXES MX,MY,Z
VIEW 60.0,30.,0.
FIND SCALE ORIGIN 10 SET 10
PLOT MODAL DEFO 0 SET 10 ORIGIN 10
$
$
BEGIN BULK
ASET    3500    123456
ASET    3501    123456
```

```
ASET1   1       163     153     154     155     156     71      286
ASET1   1       267
ASET1   1       284     281
ASET1   1       367     408     368     359     384
ASET1   1       373     364     381     383
ASET1   1       386     391     371     362     387     392     393
ASET1   1       389     369     360     385     390     370     361
ASET1   1       410
ASET1   1       3080    3082    3085
ASET1   1       3207    3210    3211    3213
ASET1   2       3079    3083
ASET1   2       3206    3212
ASET1   3       6       17      5       15      4       13      3
ASET1   3       11      2       9
ASET1   3       19      72      20      60      73      21      61
ASET1   3       39      47      56      68      81
ASET1   3       74      51      62      75      26      52      64
ASET1   3       77      29      44      53      65      78      33
ASET1   3       85      86      87      88
ASET1   3       90      103     109     89      102     108
ASET1   3       95      107     113     93      106     112     124
ASET1   3       130     133     92      105     111     123     129
ASET1   3       132     91      104     110     122     128     131
ASET1   3       233
ASET1   3       251     THRU    266
ASET1   3       3002    3004    3006    3009
ASET1   3       3076    3080    3081    3085
ASET1   3       3204    3210    3211    3213
ASET1   4       3204    3211
ASET1   5       153     154     155     156     71      286     284
ASET1   5       410
ASET1   5       459
ASET1   5       3211
ASET1   6       437     281     410
ASET1   6       458
ASET1   6       3207    3211
ASET1   123456  3088
CBAR    27      27      284     410     1.      1.      0.
CBAR    2401    2401    407     367     0.      1.      1.
CBAR    2402    2402    367     368     0.      1.      1.
CBAR    2403    2403    368     369     0.      1.      1.
CBAR    2404    2404    369     370     0.      1.      1.
CBAR    2405    2405    370     371     0.      1.      1.
CBAR    2406    2406    371     372     0.      1.      1.
CBAR    2407    2407    372     373     0.      1.      1.
CBAR    2408    2408    357     358     0.      1.      1.
CBAR    2409    2409    358     359     0.      1.      1.
CBAR    2410    2410    359     360     0.      1.      1.
CBAR    2411    2411    360     361     0.      1.      1.
CBAR    2412    2412    361     362     0.      1.      1.
CBAR    2413    2413    362     363     0.      1.      1.
CBAR    2414    2414    363     364     0.      1.      1.
CBAR    2415    2415    409     375     0.      1.      1.
CBAR    2416    2416    375     376     0.      1.      1.
CBAR    2417    2417    376     377     0.      1.      1.
CBAR    2418    2418    377     378     0.      1.      1.
CBAR    2419    2419    378     379     0.      1.      1.
CBAR    2420    2420    379     380     0.      1.      1.
CBAR    2421    2421    380     381     0.      1.      1.
CBAR    2422    2422    382     383     0.      1.      1.
CBAR    2423    2423    384     385     0.      1.      1.
CBAR    2424    2424    385     386     0.      1.      1.
CBAR    2425    2425    386     387     0.      1.      1.
CBAR    2426    2426    387     388     0.      1.      1.
CBAR    2427    2427    389     390     0.      1.      1.
CBAR    2428    2428    390     391     0.      1.      1.
CBAR    2429    2429    391     392     0.      1.      1.
CBAR    2430    2430    392     393     0.      1.      1.
CBAR    2431    2431    407     357     0.      1.      1.
CBAR    2432    2432    357     409     0.      1.      1.
CBAR    2433    2433    367     358     0.      1.      1.
CBAR    2434    2434    358     375     0.      1.      1.
CBAR    2435    2435    375     384     0.      1.      1.
CBAR    2436    2436    375     406     0.      1.      1.
CBAR    2437    2437    406     408     0.      1.      1.
CBAR    2438    2438    368     359     0.      1.      1.
CBAR    2439    2439    359     376     0.      1.      1.
CBAR    2440    2440    376     384     0.      1.      1.
CBAR    2441    2441    369     360     0.      1.      1.
CBAR    2442    2442    360     377     0.      1.      1.
CBAR    2443    2443    377     385     0.      1.      1.
CBAR    2444    2444    370     361     0.      1.      1.
CBAR    2445    2445    361     378     0.      1.      1.
CBAR    2446    2446    378     386     0.      1.      1.
CBAR    2447    2447    371     362     0.      1.      1.
CBAR    2448    2448    362     379     0.      1.      1.
CBAR    2449    2449    372     363     0.      1.      1.
CBAR    2450    2450    363     380     0.      1.      1.
CBAR    2451    2451    380     382     0.      1.      1.
CBAR    2452    2452    380     388     0.      1.      1.
CBAR    2453    2453    373     364     0.      1.      1.
CBAR    2454    2454    364     381     0.      1.      1.
CBAR    2455    2455    381     383     0.      1.      1.
CBAR    2456    2456    384     389     0.      1.      1.
CBAR    2457    2457    385     390     0.      1.      1.
CBAR    2458    2458    386     391     0.      1.      1.
CBAR    2459    2459    387     392     0.      1.      1.
CBAR    2460    2460    388     393     0.      1.      1.
CBAR    3502    3502    3500    52      1.      1.      0.
CBAR    3503    3502    3501    52      1.      1.      0.
CBEAM   1       1       163     164     1.      0.      0.
CBEAM   2       2       164     153     1.      0.      0.
CBEAM   3       3       267     154     1.      0.      0.
```

```
CBEAM   4       4       154     155     1.      0.      0.
CBEAM   5       5       155     156     1.      0.      0.
CBEAM   6       6       268     36      1.      0.      0.
CBEAM   7       7       36      42      1.      0.      0.
CBEAM   8       8       42      50      1.      0.      0.
CBEAM   9       9       50      437     1.      0.      0.
CBEAM   10      10      437     59      1.      0.      0.
CBEAM   11      11      59      431     1.      0.      0.
CBEAM   12      12      431     71      1.      0.      0.
CBEAM   13      13      71      84      1.      0.      0.
CBEAM   14      14      84      298     1.      0.      0.
CBEAM   15      15      298     286     1.      0.      0.
CBEAM   16      16      286     117     1.      0.      0.
CBEAM   17      17      117     285     1.      1.      0.
CBEAM   18      18      285     283     1.      1.      0.
CBEAM   19      19      283     284     1.      1.      0.
CBEAM   20      20      284     282     1.      1.      0.
CBEAM   21      21      282     281     1.      1.      0.
CBEAM   22      22      281     405     1.      0.      0.
CBEAM   31      31      36      35      1.      1.      0.
CBEAM   32      32      42      41      1.      1.      0.
CBEAM   33      33      50      49      1.      1.      0.
CBEAM   34      34      59      58      1.      1.      0.
CBEAM   35      35      71      70      1.      1.      0.
CBEAM   36      36      84      83      1.      1.      0.
CBEAM   37      37      117     116     1.      1.      0.
CBEAM   38      38      34      31      1.      1.      0.
CBEAM   39      39      40      37      1.      1.      0.
CBEAM   40      40      48      45      1.      1.      0.
CBEAM   41      41      57      54      1.      1.      0.
CBEAM   42      42      69      66      1.      1.      0.
CBEAM   43      43      82      94      1.      1.      0.
CBEAM   44      44      94      118     1.      1.      0.
CBEAM   45      45      118     121     1.      1.      0.
CBEAM   46      46      115     79      1.      1.      0.
CBEAM   47      47      79      120     1.      1.      0.
CBEAM   48      48      120     114     1.      1.      0.
CBEAM   49      49      31      37      1.      1.      0.                      +49BM
+49BM   46
CBEAM   50      50      37      45      1.      1.      0.
CBEAM   51      51      45      54      1.      1.      0.
CBEAM   52      52      54      66      1.      1.      0.
CBEAM   53      53      66      121     1.      1.      0.                      +53BM
+53BM           456
CBEAM   54      54      121     114     1.      1.      0.                      +54BM
+54BM   456
CBEAM   55      55      118     119     1.      1.      0.
CBEAM   56      56      119     120     1.      1.      0.
CBEAM   57      57      94      79      1.      1.      0.
CBEAM   141     141     467     274     1.      1.      0.
CBEAM   142     142     274     465     1.      1.      0.
CBEAM   143     143     465     275     1.      1.      0.
CBEAM   144     144     275     278     1.      1.      0.
CBEAM   145     145     278     280     1.      1.      0.
CBEAM   146     146     280     292     1.      1.      0.
CBEAM   147     147     292     114     1.      1.      0.                      +147BM
+147BM          456
CBEAM   148     148     466     273     1.      1.      0.
CBEAM   149     149     273     464     1.      1.      0.
CBEAM   150     150     464     276     1.      1.      0.
CBEAM   151     151     276     279     1.      1.      0.
CBEAM   152     152     279     290     1.      1.      0.
CBEAM   153     153     290     293     1.      1.      0.
CBEAM   154     154     293     79      1.      1.      0.                      +154BM
+154BM          456
CBEAM   160     160     295     300     1.      1.      0.
CBEAM   161     161     117     300     1.      1.      0.
CBEAM   162     162     300     79      1.      1.      0.
CBEAM   163     163     79      114     1.      1.      0.
CBEAM   164     164     283     295     1.      1.      0.
CBEAM   165     165     295     294     1.      1.      0.
CBEAM   166     166     293     292     1.      1.      0.
CBEAM   167     167     282     291     1.      1.      0.
CBEAM   168     168     290     280     1.      1.      0.
CBEAM   169     169     279     271     1.      1.      0.                      +169BM
+169BM  456
CBEAM   170     170     271     278     1.      1.      0.                      +170BM
+170BM          56
CBEAM   171     171     281     277     1.      1.      0.
CBEAM   172     172     276     275     1.      1.      0.
CBEAM   173     173     464     465     1.      1.      0.
CBEAM   174     174     466     467     1.      1.      0.
CBEAM   175     175     271     272     1.      1.      0.                      +175BM
+175BM  46
CBEAM   176     176     273     241     1.      1.      0.
CBEAM   177     177     241     299     1.      1.      0.
CBEAM   178     178     299     272     1.      1.      0.
CBEAM   179     179     272     274     1.      1.      0.
CBEAM   180     180     274     233     1.      1.      0.
CBEAM   181     181     195     296     1.      1.      0.                      +181BM
+181BM  56
CBEAM   182     182     296     196     1.      1.      0.                      +182BM
+182BM          56
CBEAM   1001    1001    33      39      1.      0.      0.
CBEAM   1002    1002    39      47      1.      0.      0.
CBEAM   1003    1003    47      56      1.      0.      0.
CBEAM   1004    1004    56      68      1.      0.      0.
CBEAM   1005    1005    68      81      1.      0.      0.
CBEAM   1007    1007    32      38      1.      0.      0.
CBEAM   1009    1009    30      38      1.      0.      0.
CBEAM   1010    1010    38      46      1.      0.      0.
CBEAM   1011    1011    46      55      1.      0.      0.
CBEAM   1012    1012    55      67      1.      0.      0.
CBEAM   1013    1013    67      80      1.      0.      0.
CBEAM   1014    1014    181     182     1.      0.      0.
CBEAM   1015    1015    182     183     1.      0.      0.
CBEAM   1016    1016    183     184     1.      0.      0.
CBEAM   1017    1017    184     185     1.      0.      0.
CBEAM   1018    1018    185     186     1.      0.      0.
CBEAM   1020    1020    29      44      1.      0.      0.
CBEAM   1022    1022    27      44      1.      0.      0.
CBEAM   1023    1023    44      53      1.      0.      0.
CBEAM   1024    1024    53      65      1.      0.      0.
CBEAM   1025    1025    65      78      1.      0.      0.
CBEAM   1026    1026    187     188     1.      0.      0.                      +1026BM
+1026BM 56
CBEAM   1027    1027    188     189     1.      0.      0.
CBEAM   1028    1028    189     190     1.      0.      0.
CBEAM   1029    1029    190     191     1.      0.      0.
CBEAM   1031    1031    26      52      1.      0.      0.
CBEAM   1033    1033    25      52      1.      0.      0.
CBEAM   1034    1034    52      64      1.      0.      0.
CBEAM   1035    1035    64      245     1.      0.      0.
CBEAM   1036    1036    64      77      1.      0.      0.
CBEAM   1037    1037    245     77      1.      0.      0.
CBEAM   1038    1038    192     193     1.      0.      0.
CBEAM   1039    1039    193     63      1.      0.      0.
CBEAM   1040    1040    63      245     1.      0.      0.
CBEAM   1041    1041    245     76      1.      0.      0.
CBEAM   1043    1043    24      51      1.      0.      0.
CBEAM   1045    1045    23      51      1.      0.      0.
CBEAM   1046    1046    51      62      1.      0.      0.
CBEAM   1047    1047    22      62      1.      0.      0.
CBEAM   1048    1048    62      244     1.      0.      0.
CBEAM   1049    1049    244     75      1.      0.      0.
CBEAM   1050    1050    75      88      1.      0.      0.                      +1050BM
CBEAM   1051    1051    21      61      1.      0.      0.
CBEAM   1052    1052    61      243     1.      0.      0.
CBEAM   1053    1053    243     74      1.      0.      0.                      +1053BM
+1053BM         56
CBEAM   1054    1054    74      87      1.      0.      0.                      +1054BM
CBEAM   1056    1056    20      60      1.      0.      0.
CBEAM   1057    1057    60      242     1.      0.      0.
CBEAM   1058    1058    242     73      1.      0.      0.                      +1058BM
+1058BM         56
CBEAM   1059    1059    73      86      1.      0.      0.                      +1059BM
CBEAM   1060    1060    19      143     1.      0.      0.
CBEAM   1061    1061    143     72      1.      0.      0.
CBEAM   1062    1062    72      85      1.      0.      0.                      +1062BM
CBEAM   1071    1071    33      32      0.      1.      0.
CBEAM   1072    1072    32      30      0.      1.      0.
CBEAM   1073    1073    30      181     0.      1.      0.
CBEAM   1074    1074    181     29      0.      1.      0.
CBEAM   1075    1075    39      38      0.      1.      0.
CBEAM   1076    1076    38      182     0.      1.      0.
CBEAM   1077    1077    182     29      0.      1.      0.
CBEAM   1078    1078    29      27      0.      1.      0.
CBEAM   1079    1079    27      187     0.      1.      0.
CBEAM   1080    1080    187     26      0.      1.      0.
CBEAM   1081    1081    47      46      0.      1.      0.
CBEAM   1082    1082    46      183     0.      1.      0.
CBEAM   1083    1083    183     44      0.      1.      0.
CBEAM   1084    1084    44      188     0.      1.      0.
CBEAM   1085    1085    188     26      0.      1.      0.
CBEAM   1086    1086    26      25      0.      1.      0.
CBEAM   1087    1087    25      192     0.      1.      0.
CBEAM   1088    1088    192     24      0.      1.      0.
CBEAM   1089    1089    24      23      0.      1.      0.
CBEAM   1090    1090    23      22      0.      1.      0.
CBEAM   1091    1091    56      55      0.      1.      0.
CBEAM   1092    1092    55      184     0.      1.      0.
CBEAM   1093    1093    184     53      0.      1.      0.
CBEAM   1094    1094    53      189     0.      1.      0.
CBEAM   1095    1095    189     52      0.      1.      0.
CBEAM   1096    1096    52      193     0.      1.      0.
CBEAM   1097    1097    193     51      0.      1.      0.
CBEAM   1098    1098    51      22      0.      1.      0.                      +1098BM
+1098BM         56
CBEAM   1099    1099    22      21      0.      1.      0.
CBEAM   1100    1100    21      20      0.      1.      0.
CBEAM   1101    1101    20      19      0.      1.      0.
CBEAM   1102    1102    68      67      0.      1.      0.
CBEAM   1103    1103    67      185     0.      1.      0.
CBEAM   1104    1104    185     65      0.      1.      0.
CBEAM   1105    1105    65      190     0.      1.      0.
CBEAM   1106    1106    190     64      0.      1.      0.
CBEAM   1107    1107    64      63      0.      1.      0.
CBEAM   1108    1108    63      62      0.      1.      0.
CBEAM   1109    1109    62      61      0.      1.      0.
CBEAM   1110    1110    61      60      0.      1.      0.
CBEAM   1111    1111    60      19      0.      1.      0.
CBEAM   1112    1112    245     244     0.      1.      0.
CBEAM   1113    1113    244     243     0.      1.      0.
CBEAM   1114    1114    243     242     0.      1.      0.
CBEAM   1115    1115    242     143     0.      1.      0.
CBEAM   1116    1116    81      80      0.      1.      0.
CBEAM   1117    1117    80      186     0.      1.      0.
CBEAM   1118    1118    186     78      0.      1.      0.
CBEAM   1119    1119    78      191     0.      1.      0.
CBEAM   1120    1120    191     77      0.      1.      0.
CBEAM   1121    1121    77      76      0.      1.      0.
CBEAM   1122    1122    76      75      0.      1.      0.
CBEAM   1123    1123    75      74      0.      1.      0.
CBEAM   1124    1124    74      73      0.      1.      0.
CBEAM   1125    1125    73      72      0.      1.      0.
CBEAM   1126    1126    88      87      0.      1.      0.                      +1126BM
CBEAM   1127    1127    87      86      0.      1.      0.
CBEAM   1128    1128    86      85      0.      1.      0.                      +1128BM
CBEAM   1131    1131    7       18      1.      0.      0.
CBEAM   1132    1132    6       16      1.      0.      0.
CBEAM   1133    1133    16      17      1.      0.      0.
CBEAM   1134    1134    17      30      1.      0.      0.                      +BM1134
+BM1134 5
CBEAM   1135    1135    176     180     1.      0.      0.
CBEAM   1136    1136    5       14      1.      0.      0.
CBEAM   1137    1137    14      15      1.      0.      0.
CBEAM   1138    1138    15      27      1.      0.      0.                      +BM1138
+BM1138 5
CBEAM   1139    1139    175     179     1.      0.      0.
CBEAM   1140    1140    4       12      1.      0.      0.
CBEAM   1141    1141    12      13      1.      0.      0.
CBEAM   1142    1142    13      25      1.      0.      0.                      +BM1142
+BM1142 5
CBEAM   1143    1143    174     178     1.      0.      0.
CBEAM   1144    1144    3       10      1.      0.      0.
CBEAM   1145    1145    10      11      1.      0.      0.
CBEAM   1146    1146    11      23      1.      0.      0.                      +BM1146
+BM1146 5
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CBEAM   1147    1147    173     177     1.      0.      0.
CBEAM   1148    1148    2       194     1.      0.      0.
CBEAM   1149    1149    194     9       1.      0.      0.
CBEAM   1150    1150    9       20      1.      0.      0.              +BM1150
+BM1150 5
CBEAM   1151    1151    1       8       1.      0.      0.
CBEAM   1152    1152    6       7       1.      0.      0.
CBEAM   1153    1153    176     6       1.      0.      0.
CBEAM   1154    1154    5       176     1.      0.      0.
CBEAM   1155    1155    175     5       1.      0.      0.
CBEAM   1156    1156    4       175     1.      0.      0.
CBEAM   1157    1157    174     4       1.      0.      0.
CBEAM   1158    1158    3       174     1.      0.      0.
CBEAM   1159    1159    173     3       1.      0.      0.
CBEAM   1160    1160    2       173     1.      0.      0.
CBEAM   1161    1161    1       2       1.      0.      0.
CBEAM   1162    1162    16      18      1.      0.      0.
CBEAM   1163    1163    180     16      1.      0.      0.
CBEAM   1164    1164    14      180     1.      0.      0.
CBEAM   1165    1165    179     14      1.      0.      0.
CBEAM   1166    1166    12      179     1.      0.      0.
CBEAM   1167    1167    178     12      1.      0.      0.
CBEAM   1168    1168    10      178     1.      0.      0.
CBEAM   1169    1169    177     10      1.      0.      0.
CBEAM   1170    1170    194     177     1.      0.      0.
CBEAM   1171    1171    8       194     1.      0.      0.
CBEAM   1181    1181    81      95      1.      0.      0.              +BM1181
+BM1181         456
CBEAM   1182    1182    95      142     1.      0.      0.
CBEAM   1183    1183    142     101     1.      0.      0.
CBEAM   1184    1184    101     107     1.      0.      0.
CBEAM   1185    1185    107     113     1.      0.      0.
CBEAM   1186    1186    93      141     1.      0.      0.
CBEAM   1187    1187    141     100     1.      0.      0.
CBEAM   1188    1188    100     106     1.      0.      0.
CBEAM   1189    1189    106     112     1.      0.      0.
CBEAM   1190    1190    186     124     1.      0.      0.              +BM1190
+BM1190         456
CBEAM   1191    1191    124     140     1.      0.      0.
CBEAM   1192    1192    140     127     1.      0.      0.
CBEAM   1193    1193    127     130     1.      0.      0.
CBEAM   1194    1194    130     133     1.      0.      0.
CBEAM   1195    1195    92      139     1.      0.      0.
CBEAM   1196    1196    139     99      1.      0.      0.
CBEAM   1197    1197    99      105     1.      0.      0.
CBEAM   1198    1198    105     111     1.      0.      0.
CBEAM   1199    1199    191     123     1.      0.      0.              +BM1199
+BM1199         456
CBEAM   1200    1200    123     138     1.      0.      0.
CBEAM   1201    1201    138     126     1.      0.      0.
CBEAM   1202    1202    126     129     1.      0.      0.
CBEAM   1203    1203    129     132     1.      0.      0.
CBEAM   1204    1204    91      137     1.      0.      0.
CBEAM   1205    1205    137     98      1.      0.      0.
CBEAM   1206    1206    98      104     1.      0.      0.
CBEAM   1207    1207    104     110     1.      0.      0.
CBEAM   1208    1208    122     136     1.      0.      0.
CBEAM   1209    1209    136     125     1.      0.      0.
CBEAM   1210    1210    125     128     1.      0.      0.
CBEAM   1211    1211    128     131     1.      0.      0.
CBEAM   1212    1212    76      90      1.      0.      0.              +BM1212
+BM1212         456
CBEAM   1213    1213    90      135     1.      0.      0.
CBEAM   1214    1214    135     97      1.      0.      0.
CBEAM   1215    1215    97      103     1.      0.      0.
CBEAM   1216    1216    103     109     1.      0.      0.
CBEAM   1217    1217    89      134     1.      0.      0.
CBEAM   1218    1218    134     96      1.      0.      0.
CBEAM   1219    1219    96      102     1.      0.      0.
CBEAM   1220    1220    102     108     1.      0.      0.
CBEAM   1231    1231    141     142     1.      0.      0.
CBEAM   1232    1232    140     141     1.      0.      0.
CBEAM   1233    1233    139     140     1.      0.      0.
CBEAM   1234    1234    138     139     1.      0.      0.
CBEAM   1235    1235    137     138     1.      0.      0.
CBEAM   1236    1236    136     137     1.      0.      0.
CBEAM   1237    1237    135     136     1.      0.      0.
CBEAM   1238    1238    134     135     1.      0.      0.
CBEAM   1241    1241    100     101     1.      0.      0.
CBEAM   1242    1242    127     100     1.      0.      0.
CBEAM   1243    1243    99      127     1.      0.      0.
CBEAM   1244    1244    126     99      1.      0.      0.
CBEAM   1245    1245    98      126     1.      0.      0.
CBEAM   1246    1246    125     98      1.      0.      0.
CBEAM   1247    1247    97      125     1.      0.      0.
CBEAM   1248    1248    96      97      1.      0.      0.
CBEAM   1251    1251    106     107     1.      0.      0.
CBEAM   1252    1252    130     106     1.      0.      0.
CBEAM   1253    1253    105     130     1.      0.      0.
CBEAM   1254    1254    129     105     1.      0.      0.
CBEAM   1255    1255    104     129     1.      0.      0.
CBEAM   1256    1256    128     104     1.      0.      0.
CBEAM   1257    1257    103     128     1.      0.      0.
CBEAM   1258    1258    102     103     1.      0.      0.
CBEAM   1261    1261    112     113     1.      0.      0.
CBEAM   1262    1262    133     112     1.      0.      0.
CBEAM   1263    1263    111     133     1.      0.      0.
CBEAM   1264    1264    132     111     1.      0.      0.
CBEAM   1265    1265    110     132     1.      0.      0.
CBEAM   1266    1266    131     110     1.      0.      0.
CBEAM   1267    1267    109     131     1.      0.      0.
CBEAM   1268    1268    108     109     1.      0.      0.
CBEAM   2001    2001    251     506     1.      1.      0.              +BM2001
+BM2001 456
CBEAM   2002    2002    506     233     1.      1.      0.
CBEAM   2003    2003    233     517     1.      1.      0.
CBEAM   2004    2004    517     262     1.      1.      0.              +BM2004
+BM2004         456
CBEAM   2005    2005    252     507     1.      1.      0.              +BM2005
+BM2005 456
CBEAM   2006    2006    507     257     1.      1.      0.
CBEAM   2007    2007    257     518     1.      1.      0.
CBEAM   2008    2008    518     262     1.      1.      0.              +BM2008
+BM2008         456
CBEAM   2009    2009    253     508     1.      1.      0.              +BM2009
+BM2009 456
CBEAM   2010    2010    508     258     1.      1.      0.
CBEAM   2011    2011    258     519     1.      1.      0.
CBEAM   2012    2012    519     263     1.      1.      0.              +BM2012
+BM2012         456
CBEAM   2013    2013    254     509     1.      1.      0.              +BM2013
+BM2013 456
CBEAM   2014    2014    509     259     1.      1.      0.
CBEAM   2015    2015    259     520     1.      1.      0.
CBEAM   2016    2016    520     264     1.      1.      0.              +BM2016
+BM2016         456
CBEAM   2017    2017    255     510     1.      1.      0.              +BM2017
+BM2017 456
CBEAM   2018    2018    510     260     1.      1.      0.
CBEAM   2019    2019    260     521     1.      1.      0.
CBEAM   2020    2020    521     265     1.      1.      0.              +BM2020
+BM2020         456
CBEAM   2021    2021    256     511     1.      1.      0.              +BM2021
+BM2021 456
CBEAM   2022    2022    511     261     1.      1.      0.              +BM2022
+BM2022         456
CBEAM   2023    2023    261     522     1.      1.      0.              +BM2023
+BM2023 456
CBEAM   2024    2024    522     266     1.      1.      0.              +BM2024
+BM2024         456
CBEAM   2031    2031    251     501     1.      1.      0.              +BM2031
+BM2031 456
CBEAM   2032    2032    501     252     1.      1.      0.
CBEAM   2033    2033    252     502     1.      1.      0.
CBEAM   2034    2034    502     253     1.      1.      0.
CBEAM   2035    2035    253     503     1.      1.      0.
CBEAM   2036    2036    503     254     1.      1.      0.
CBEAM   2037    2037    254     504     1.      1.      0.
CBEAM   2038    2038    504     255     1.      1.      0.
CBEAM   2039    2039    255     505     1.      1.      0.
CBEAM   2040    2040    505     256     1.      1.      0.              +BM2040
+BM2040         456
CBEAM   2041    2041    233     512     1.      1.      0.
CBEAM   2042    2042    512     257     1.      1.      0.
CBEAM   2043    2043    257     513     1.      1.      0.
CBEAM   2044    2044    513     258     1.      1.      0.
CBEAM   2045    2045    258     514     1.      1.      0.
CBEAM   2046    2046    514     259     1.      1.      0.
CBEAM   2047    2047    259     515     1.      1.      0.
CBEAM   2048    2048    515     260     1.      1.      0.
CBEAM   2049    2049    260     516     1.      1.      0.
CBEAM   2050    2050    516     261     1.      1.      0.              +BM2050
+BM2050         456
CBEAM   2051    2051    262     523     1.      1.      0.              +BM2051
+BM2051 456
CBEAM   2052    2052    523     263     1.      1.      0.
CBEAM   2053    2053    263     524     1.      1.      0.
CBEAM   2054    2054    524     264     1.      1.      0.
CBEAM   2055    2055    264     525     1.      1.      0.
CBEAM   2056    2056    525     265     1.      1.      0.
CBEAM   2057    2057    265     526     1.      1.      0.
CBEAM   2058    2058    526     266     1.      1.      0.              +BM2058
+BM2058         456
CBEAM   3001    3001    19      3007    0.      1.      0.
CBEAM   3002    3002    3001    3008    0.      1.      0.
CBEAM   3003    3003    3002    3003    1.      0.      0.
CBEAM   3004    3004    3003    3004    1.      0.      0.
CBEAM   3005    3005    3004    3005    1.      0.      0.
CBEAM   3006    3006    3005    3006    1.      0.      0.
CBEAM   3007    3007    3006    3007    1.      0.      0.
CBEAM   3008    3008    3007    3008    1.      0.      0.
CBEAM   3009    3009    3008    3009    1.      0.      0.              +3009
+3009           5
CBEAM   3131    3131    21      3076    0.      0.      1.              +3131
+3131   56
CBEAM   3132    3132    3076    61      0.      0.      1.              +3132
+3132           56
CBEAM   3133    3133    3076    3079    0.      1.      0.              +3133
+3133   5       6
CBEAM   3134    3133    3079    3083    0.      1.      0.
CBEAM   3135    3135    3082    3077    0.      1.      0.
CBEAM   3136    3136    3077    3078    0.      0.      1.              +3136
+3136           6
CBEAM   3137    3137    3084    3078    0.      1.      0.              +3137
+3137   6
CBEAM   3138    3138    3082    3083    0.      0.      1.              +3138
+3138   56
CBEAM   3139    3138    3083    3084    0.      0.      1.              +3139
+3139           56
CBEAM   3140    3140    3080    3081    0.      0.      1.
CBEAM   3141    3140    3081    3082    0.      0.      1.
CBEAM   3142    3140    3082    3084    0.      0.      1.
CBEAM   3143    3140    3084    3085    0.      0.      1.
CBEAM   3144    3144    3080    3081    0.      0.      1.              +3144
CBEAM   3145    3145    3081    3082    0.      0.      1.
CBEAM   3146    3146    3082    3084    0.      0.      1.
CBEAM   3147    3147    3084    3085    0.      0.      1.              +3147
+3147           5
CBEAM   3155    3155    3080    3087    0.      1.      0.              +3155
+3155   46
CBEAM   3156    3156    3081    3089    0.      1.      0.
CBEAM   3157    3155    3085    3090    0.      1.      0.              +3157
+3157   246
CBEAM   3255    3255    3080    3087    0.      1.      0.              +3255
+3255   46
CBEAM   3257    3255    3085    3090    0.      1.      0.              +3257
+3257   246
CBEAM   3391    3391    29      3196    0.      0.      1.              +3391
+3391   456
CBEAM   3392    3391    3196    182     0.      0.      1.              +3392
+3392           456
CBEAM   3393    3391    182     3197    0.      0.      1.              +3393
+3393   456
CBEAM   3394    3391    3197    38      0.      0.      1.              +3394
+3394           456
CBEAM   3395    3391    44      3198    0.      0.      1.              +3395
+3395   456
CBEAM   3396    3391    3198    183     0.      0.      1.              +3396
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+3396           456
CBEAM   3397    3391    183     3199    0.      0.      1.      +3397
+3397   456
CBEAM   3398    3391    3199    46      0.      0.      1.      +3398
+3398           456
CBEAM   3399    3391    3198    3200    0.      0.      1.
CBEAM   3400    3391    3200    3196    0.      0.      1.
CBEAM   3401    3391    3199    3202    0.      0.      1.
CBEAM   3402    3391    3202    3197    0.      0.      1.
CBEAM   3403    3391    3200    3201    0.      0.      1.      +3403
+3403   5
CBEAM   3404    3391    3201    3202    0.      0.      1.      +3404
+3404           5
CBEAM   3405    3405    3203    3204    0.      0.      1.
CBEAM   3406    3405    3204    3205    0.      0.      1.
CBEAM   3407    3407    3204    3206    0.      1.      0.      +3407
+3407           6
CBEAM   3408    3407    3206    3207    0.      1.      0.
CBEAM   3409    3409    3207    3208    0.      0.      1.
CBEAM   3410    3409    3209    3212    0.      1.      0.
CBEAM   3411    3405    3210    3211    0.      0.      1.
CBEAM   3412    3409    3211    3212    0.      0.      1.
CBEAM   3413    3405    3212    3213    0.      0.      1.
CBEAM   4148    4148    3086    3087    0.      0.      1.
CBEAM   4149    4148    3087    3088    0.      0.      1.
CBEAM   4150    4148    3088    3090    0.      0.      1.
CBEAM   4151    4151    3086    3087    0.      0.      1.
CBEAM   4152    4151    3087    3088    0.      0.      1.
CBEAM   4153    4151    3088    3089    0.      0.      1.
CBEAM   4154    4151    3089    3090    0.      0.      1.
CBEAM   5002    5002    153     267     1.      0.      0.
CBEAM   5051    5051    156     458     1.      0.      0.
CBEAM   5052    5052    458     459     1.      0.      0.
CBEAM   5053    5053    459     268     1.      0.      0.
CELAS2  61      36.6E6  34      5       35      5
CELAS2  62      71.0E6  40      5       41      5
CELAS2  63      94.1E6  48      5       49      5
CELAS2  64      132.4E6 57      5       58      5
CELAS2  65      110.0E6 69      5       70      5
CELAS2  66      51.7E6  82      5       83      5
CELAS2  67      5.0E6   115     5       116     5
CELAS2  191     11.25E6 277     5       276     5
CELAS2  192     22.0E6  291     5       290     5
CELAS2  193     9.68E6  294     5       293     5
CELAS2  194     156610. 298     3       195     3
CELAS2  195     67829.  284     3       196     3
CELAS2  1172    5650000.17      4       30      4
CELAS2  1173    5590000.15      4       27      4
CELAS2  1174    1600000.13      4       25      4
CELAS2  1175    2030000.11      4       23      4
CELAS2  1221    3307000.142     4       141     4
CELAS2  1222    268300. 141     4       140     4
CELAS2  1223    137300. 140     4       139     4
CELAS2  1224    105200. 139     4       138     4
CELAS2  1225    85600.  138     4       137     4
CELAS2  1226    69900.  137     4       136     4
CELAS2  1227    57700.  136     4       135     4
CELAS2  1228    40000.  135     4       134     4
CELAS2  1229    6229750.142     4       119     4
CELAS2  3161    193.E6  3076    4       3083    4
CELAS2  3414    1515.E5 3204    4       3207    4
CELAS2  3415    1724.E5 3212    4       3208    4
CELAS2  3416    580.4E5 3204    6       3207    6
CELAS2  3417    2652.5E53208    6       3209    6
CELAS2  3418    732.68E53208    5       3209    5
CONM1   301     19      0                                       +301
+301    9.565
CONM1   302     72      0                                       +302
+302    16.770
CONM1   303     20      0                                       +303
+303    7.972
CONM1   304     60      0                                       +304
+304    10.110
CONM1   305     73      0                                       +305
+305    7.755
CONM1   306     21      0                                       +306
+306    3.712
CONM1   307     61      0                                       +307
+307    20.285
CONM1   308     74      0                                       +308
+308    9.982
CONM1   309     51      0                                       +309
+309    32.156
CONM1   310     62      0                                       +310
+310    25.281
CONM1   311     75      0                                       +311
+311    14.285
CONM1   312     26      0                                       +312
+312    42.942
CONM1   313     52      0                                       +313
+313    57.288
CONM1   314     64      0                                       +314
+314    46.648
CONM1   315     77      0                                       +315
+315    20.983
CONM1   316     29      0                                       +316
+316    60.677
CONM1   317     44      0                                       +317
+317    80.964
CONM1   318     53      0                                       +318
+318    74.861
CONM1   319     65      0                                       +319
+319    56.266
CONM1   320     78      0                                       +320
+320    28.341
CONM1   321     33      0                                       +321
+321    37.854
CONM1   322     39      0                                       +322
+322    99.621
CONM1   323     47      0                                       +323
+323    105.244
CONM1   324     56      0                                       +324
+324    95.811
CONM1   325     68      0                                       +325
+325    83.620
CONM1   326     81      0                                       +326
+326    33.148
CONM1   341     85      0                                       +341
+341    .6
CONM1   342     86      0                                       +342
+342    1.6
CONM1   343     87      0                                       +343
+343    1.8
CONM1   344     88      0                                       +344
+344    1.
CONM1   345     6       0                                       +345
+345    12.03
CONM1   346     17      0                                       +346
+346    57.78
CONM1   347     5       0                                       +347
+347    10.08
CONM1   348     15      0                                       +348
+348    42.72
CONM1   349     4       0                                       +349
+349    6.92
CONM1   350     13      0                                       +350
+350    27.67
CONM1   351     3       0                                       +351
+351    5.17
CONM1   352     11      0                                       +352
+352    27.65
CONM1   353     2       0                                       +353
+353    4.08
CONM1   354     9       0                                       +354
+354    3.71
CONM1   355     95      0                                       +355
+355    9.133
CONM1   356     107     0                                       +356
+356    6.765
CONM1   357     113     0                                       +357
+357    .022
CONM1   358     93      0                                       +358
+358    10.32
CONM1   359     106     0                                       +359
+359    10.12
CONM1   360     112     0                                       +360
+360    .149
CONM1   361     124     0                                       +361
+361    5.816
CONM1   362     130     0                                       +362
+362    7.986
CONM1   363     133     0                                       +363
+363    .998
CONM1   364     92      0                                       +364
+364    4.56
CONM1   365     105     0                                       +365
+365    6.797
CONM1   366     111     0                                       +366
+366    .952
CONM1   367     123     0                                       +367
+367    3.296
CONM1   368     129     0                                       +368
+368    4.727
CONM1   369     132     0                                       +369
+369    .647
CONM1   370     91      0                                       +370
+370    2.069
CONM1   371     104     0                                       +371
+371    3.014
CONM1   372     110     0                                       +372
+372    .477
CONM1   373     122     0                                       +373
+373    1.784
CONM1   374     128     0                                       +374
+374    2.632
CONM1   375     131     0                                       +375
+375    .435
CONM1   376     90      0                                       +376
+376    1.644
CONM1   377     103     0                                       +377
+377    2.354
CONM1   378     109     0                                       +378
+378    .272
CONM1   379     89      0                                       +379
+379    .651
CONM1   380     102     0                                       +380
+380    1.075
CONM1   381     108     0                                       +381
+381    .284
CONM1   391     163     0                                       +391
+391    314.21
CONM1   392     153     0                                       +392
+392    463.77
CONM1   393     154     0                                       +393
+393    870.68
CONM1   394     155     0                                       +394
+394    1299.38
CONM1   395     156     0                                       +395
+395    1545.78
CONM1   396     42      0                                       +396
+396    1799.25
CONM1   397     71      0                                       +397
+397    1412.77
CONM1   398     286     0                                       +398
+398    893.77
CONM1   399     284     0                                       +399
+399    335.19
CONM1   400     281     0                                       +400
+400    708.33
CONM1   401     163     0       314.21
CONM1   402     153     0       463.77
CONM1   403     154     0       870.68
CONM1   404     155     0       1299.38
CONM1   405     156     0       1545.78
CONM1   406     42      0       2036.16
CONM1   407     71      0       2468.11
CONM1   408     286     0       893.77
CONM1   409     284     0       311.29
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CONM1   410     281     0       796.72
CONM1   411     153     0                                               +411
+411                                                                    +411A
+411A           119126.
CONM1   412     154     0                                               +412
+412                                                                    +412A
+412A           498740.
CONM1   413     155     0                                               +413
+413                                                                    +413A
+413A           233410.
CONM1   414     156     0                                               +414
+414                                                                    +414A
+414A           865169.
CONM1   415     42      0                                               +415
+415                                                                    +415A
+415A           1051483.
CONM1   416     71      0                                               +416
+416                                                                    +416A
+416A           1042917.
CONM1   417     286     0                                               +417
+417                                                                    +417A
+417A           556929.
CONM1   418     284     0                                               +418
+418                                                                    +418A
+418A           756147.
CONM1   430     195     0                                               +430
+430    -82.94
CONM1   431     296     0                                               +431
+431                                    3803477.
CONM1   432     296     0                                               +432
+432    2073.44
CONM1   433     42      0                               12204.0
CONM1   434     437     0                                               +434
+434                                                                    +434A
+434A                                                           19.7E6
CONM1   435     281     0                                               +435
+435                                                                    +435A
+435A                                                           945062.
CONM1   436     410     0                                               +436
+436                                                                    +436A
+436A           502624.
CONM1   437     410     0                                               +437
+437                                                                    +437A
+437A                                                           3604069.
CONM1   438     410     0       1990.5
CONM1   446     251     0                                               +446
+446    4.65
CONM1   447     252     0                                               +447
+447    5.123
CONM1   448     253     0                                               +448
+448    4.812
CONM1   449     254     0                                               +449
+449    3.069
CONM1   450     255     0                                               +450
+450    1.73
CONM1   451     256     0                                               +451
+451    2.547
CONM1   452     233     0                                               +452
+452    176.302
CONM1   453     257     0                                               +453
+453    31.053
CONM1   454     258     0                                               +454
+454    17.674
CONM1   455     259     0                                               +455
+455    11.742
CONM1   456     260     0                                               +456
+456    7.391
CONM1   457     261     0                                               +457
+457    2.877
CONM1   458     262     0                                               +458
+458    3.675
CONM1   459     263     0                                               +459
+459    3.064
CONM1   460     264     0                                               +460
+460    2.838
CONM1   461     265     0                                               +461
+461    2.73
CONM1   462     266     0                                               +462
+462    .976
CONM1   501     407     0       18.24
CONM1   502     409     0       24.64
CONM1   503     367     0       23.43
CONM1   504     408     0       30.93
CONM1   505     368     0       4.55
CONM1   506     359     0       15.9
CONM1   507     384     0       15.24
CONM1   508     389     0       .75
CONM1   509     369     0       3.81
CONM1   510     360     0       6.67
CONM1   511     385     0       5.77
CONM1   512     390     0       1.11
CONM1   513     370     0       2.55
CONM1   514     361     0       3.55
CONM1   515     386     0       3.1
CONM1   516     391     0       .93
CONM1   517     371     0       1.12
CONM1   518     362     0       2.9
CONM1   519     387     0       2.4
CONM1   520     392     0       .59
CONM1   521     393     0       .37
CONM1   522     373     0       1.94
CONM1   523     364     0       .48
CONM1   524     381     0       2.66
CONM1   525     383     0       .89
CONM1   526     281                                                     +526
+526                                    822933.
CONM1   3020    3004                                                    +3020
+3020   23.24
CONM1   3021    3006                                                    +3021
+3021   21.35
CONM1   3022    3009                                                    +3022
+3022   14.41
CONM1   3023    3002                                                    +3023
+3023   16.5
```

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CONM1   3045    3088                    200.            200.                    +3045
+3045   200.                                    236476.8                        +3045A
+3045A          1947.                                           236476.
CONM1   3176    3076    0                                               +3176
+3176   25.4
CONM1   3177    3079    0                       25.4
CONM1   3178    3080    0       56.46                                   +3178
+3178   56.73
CONM1   3179    3081    0                                               +3179
+3179   -4.88
CONM1   3180    3082    0       7.47
CONM1   3181    3083    0                       87.0
CONM1   3182    3085    0       35.77                                   +3182
+3182   35.15
CONM1   3427    3204    0                                               +3427
+3427   208.0                           125.E3
CONM1   3428    3206    0                       208.
CONM1   3429    3207    0       208.0                                   +3429
+3429                                                                   +3429A
+3429A                                                          125.E3
CONM1   3430    3210    0       .01                                     +40430
+40430  .01
CONM1   3431    3211    0       229.3                                   +40431
+40431  229.3                           561149.                         +40431A
+40431A         32000.                                          561149.
CONM1   3432    3212    0                       231.3
CONM1   3433    3213    0       2.0                                     +40433
+40433  2.0
CONM2   3501    3500            345.    0.      0.      0.              +000001
++000001448146.7        3013.92                 447868.5                +000002
CONM2   3504    3501            138.    0.      0.      0.              +000003
++00000366538.01        6769.7                  62828.60                +000004
CONROD  183     272     233     2                       16.0875
CONROD  2201    233     1233    2       .0001
CONROD  2202    233     2233    2       .0001
CONROD  2203    251     1251    2       .0001
CONROD  2204    251     2251    2       .0001
CONROD  2205    252     1252    2       .0001
CONROD  2206    252     2252    2       .0001
CONROD  2207    253     1253    2       .0001
CONROD  2208    253     2253    2       .0001
CONROD  2209    254     1254    2       .0001
CONROD  2210    254     2254    2       .0001
CONROD  2211    255     1255    2       .0001
CONROD  2212    255     2255    2       .0001
CONROD  2213    256     1256    2       .0001
CONROD  2214    256     2256    2       .0001
CONROD  2215    257     1257    2       .0001
CONROD  2216    257     2257    2       .0001
CONROD  2217    258     1258    2       .0001
CONROD  2218    258     2258    2       .0001
CONROD  2219    259     1259    2       .0001
CONROD  2220    259     2259    2       .0001
CONROD  2221    260     1260    2       .0001
CONROD  2222    260     2260    2       .0001
CONROD  2223    261     1261    2       .0001
CONROD  2224    261     2261    2       .0001
CONROD  2225    262     1262    2       .0001
CONROD  2226    262     2262    2       .0001
CONROD  2227    263     1263    2       .0001
CONROD  2228    263     2263    2       .0001
CONROD  2229    264     1264    2       .0001
CONROD  2230    264     2264    2       .0001
CONROD  2231    265     1265    2       .0001
CONROD  2232    265     2265    2       .0001
CONROD  2233    266     1266    2       .0001
CONROD  2234    266     2266    2       .0001
CONROD  3010    3004    3007    2               4.5
CONROD  3160    3080    3082    2               20.
CORD1R  5       701     702     703
CORD2C *3               0               -63.574         -294.247        *CORD3A
*CORD3A 0.              -143.398002     -351.530085     0.              +CORD3B
+CORD3B -63.574 -294.247100.
CORD2R  1       0       -62.153 -293.2270.      -62.153 -293.227100.    *CORD1
*CORD1  19.092002       -234.923915     0.
CORD2R  7       0       -41.5   -378.02 0.      -41.5   -378.02 100.    *CORD7
*CORD7  57.2946361      -362.5403399    0.
CQUAD4  601     601     1033    1039    1038    1032
CQUAD4  602     602     1039    1047    1046    1038
CQUAD4  603     603     1047    1056    1055    1046
CQUAD4  604     604     1056    1068    1067    1055
CQUAD4  605     605     1068    1081    1080    1067
CQUAD4  607     607     1038    1182    1181    1030
CQUAD4  608     608     1038    1046    1183    1182
CQUAD4  609     609     1046    1055    1184    1183
CQUAD4  610     610     1055    1067    1185    1184
CQUAD4  611     611     1067    1080    1186    1185
CQUAD4  613     613     1182    1183    1044    1029
CQUAD4  614     614     1183    1184    1053    1044
CQUAD4  615     615     1184    1185    1065    1053
CQUAD4  616     616     1185    1186    1078    1065
CQUAD4  618     618     1027    1044    1188    1187
CQUAD4  619     619     1044    1053    1189    1188
CQUAD4  620     620     1053    1065    1190    1189
CQUAD4  621     621     1065    1078    1191    1190
CQUAD4  623     623     1188    1189    1052    1026
CQUAD4  624     624     1189    1190    1064    1052
CQUAD4  625     625     1190    1191    1077    1064
CQUAD4  627     627     1025    1052    1193    1192
CQUAD4  628     628     1052    1064    1063    1193
CQUAD4  632     632     1192    1193    1051    1024
CQUAD4  633     633     1193    1063    1062    1051
CQUAD4  634     634     1063    1245    1244    1062
CQUAD4  635     635     1245    1076    1075    1244
CQUAD4  639     639     1062    1061    1021    1022
CQUAD4  640     640     1062    1244    1243    1061
CQUAD4  641     641     1244    1075    1074    1243
CQUAD4  643     643     1021    1061    1060    1020
CQUAD4  644     644     1061    1243    1242    1060
CQUAD4  645     645     1243    1074    1073    1242
CQUAD4  648     648     1060    1242    1143    1019
CQUAD4  649     649     1242    1073    1072    1143
CQUAD4  661     661     1142    1101    1100    1141
CQUAD4  662     662     1101    1107    1106    1100
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CQUAD4	663	663	1107	1113	1112	1106			
CQUAD4	664	664	1141	1100	1127	1140			
CQUAD4	665	665	1100	1106	1130	1127			
CQUAD4	666	666	1106	1112	1133	1130			
CQUAD4	667	667	1140	1127	1099	1139			
CQUAD4	668	668	1127	1130	1105	1099			
CQUAD4	669	669	1130	1133	1111	1105			
CQUAD4	670	670	1139	1099	1126	1138			
CQUAD4	671	671	1099	1105	1129	1126			
CQUAD4	672	672	1105	1111	1132	1129			
CQUAD4	673	673	1138	1126	1098	1137			
CQUAD4	674	674	1126	1129	1104	1098			
CQUAD4	675	675	1129	1132	1110	1104			
CQUAD4	676	676	1137	1098	1125	1136			
CQUAD4	677	677	1098	1104	1128	1125			
CQUAD4	678	678	1104	1110	1131	1128			
CQUAD4	679	679	1136	1125	1097	1135			
CQUAD4	680	680	1125	1128	1103	1097			
CQUAD4	681	681	1128	1131	1109	1103			
CQUAD4	682	682	1135	1097	1096	1134			
CQUAD4	683	683	1097	1103	1102	1096			
CQUAD4	684	684	1103	1109	1108	1102			
CQUAD4	1601	601	2033	2039	2038	2032			
CQUAD4	1602	602	2039	2047	2046	2038			
CQUAD4	1603	603	2047	2056	2055	2046			
CQUAD4	1604	604	2056	2068	2067	2055			
CQUAD4	1605	605	2068	2081	2080	2067			
CQUAD4	1607	607	2038	2182	2181	2030			
CQUAD4	1608	608	2038	2046	2183	2182			
CQUAD4	1609	609	2046	2055	2184	2183			
CQUAD4	1610	610	2055	2067	2185	2184			
CQUAD4	1611	611	2067	2080	2186	2185			
CQUAD4	1613	613	2182	2183	2044	2029			
CQUAD4	1614	614	2183	2184	2053	2044			
CQUAD4	1615	615	2184	2185	2065	2053			
CQUAD4	1616	616	2185	2186	2078	2065			
CQUAD4	1618	618	2027	2044	2188	2187			
CQUAD4	1619	619	2044	2053	2189	2188			
CQUAD4	1620	620	2053	2065	2190	2189			
CQUAD4	1621	621	2065	2078	2191	2190			
CQUAD4	1623	623	2188	2189	2052	2026			
CQUAD4	1624	624	2189	2190	2064	2052			
CQUAD4	1625	625	2190	2191	2077	2064			
CQUAD4	1627	627	2025	2052	2193	2192			
CQUAD4	1628	628	2052	2064	2063	2193			
CQUAD4	1632	632	2192	2193	2051	2024			
CQUAD4	1633	633	2193	2063	2062	2051			
CQUAD4	1634	634	2063	2245	2244	2062			
CQUAD4	1635	635	2245	2076	2075	2244			
CQUAD4	1639	639	2062	2061	2021	2022			
CQUAD4	1640	640	2062	2244	2243	2061			
CQUAD4	1641	641	2244	2075	2074	2243			
CQUAD4	1643	643	2021	2061	2060	2020			
CQUAD4	1644	644	2061	2243	2242	2060			
CQUAD4	1645	645	2243	2074	2073	2242			
CQUAD4	1648	648	2060	2242	2143	2019			
CQUAD4	1649	649	2242	2073	2072	2143			
CQUAD4	1661	661	2142	2101	2100	2141			
CQUAD4	1662	662	2101	2107	2106	2100			
CQUAD4	1663	663	2107	2113	2112	2106			
CQUAD4	1664	664	2141	2100	2127	2140			
CQUAD4	1665	665	2100	2106	2130	2127			
CQUAD4	1666	666	2106	2112	2133	2130			
CQUAD4	1667	667	2140	2127	2099	2139			
CQUAD4	1668	668	2127	2130	2105	2099			
CQUAD4	1669	669	2130	2133	2111	2105			
CQUAD4	1670	670	2139	2099	2126	2138			
CQUAD4	1671	671	2099	2105	2129	2126			
CQUAD4	1672	672	2105	2111	2132	2129			
CQUAD4	1673	673	2138	2126	2098	2137			
CQUAD4	1674	674	2126	2129	2104	2098			
CQUAD4	1675	675	2129	2132	2110	2104			
CQUAD4	1676	676	2137	2098	2125	2136			
CQUAD4	1677	677	2098	2104	2128	2125			
CQUAD4	1678	678	2104	2110	2131	2128			
CQUAD4	1679	679	2136	2125	2097	2135			
CQUAD4	1680	680	2125	2128	2103	2097			
CQUAD4	1681	681	2128	2131	2109	2103			
CQUAD4	1682	682	2135	2097	2096	2134			
CQUAD4	1683	683	2097	2103	2102	2096			
CQUAD4	1684	684	2103	2109	2108	2102			
CQUAD8	701	701	1257	1252	1251	1233	1507	1501	+701
+701	1506	1512					99.5		
CQUAD8	702	702	1252	1257	1258	1253	1507	1513	+702
+702	1508	1502					99.5		
CQUAD8	703	703	1253	1258	1259	1254	1508	1514	+703
+703	1509	1503					99.5		
CQUAD8	704	704	1254	1259	1260	1255	1509	1515	+704
+704	1510	1504					99.5		
CQUAD8	705	705	1255	1260	1261	1256	1510	1516	+705
+705	1511	1505					99.5		
CQUAD8	707	707	1257	1262	1263	1258	1518	1523	+707
+707	1519	1513					99.5		
CQUAD8	708	708	1258	1263	1264	1259	1519	1524	+708
+708	1520	1514					99.5		
CQUAD8	709	709	1259	1264	1265	1260	1520	1525	+709
+709	1521	1515					99.5		
CQUAD8	710	710	1260	1265	1266	1261	1521	1526	+710
+710	1522	1516					99.5		
CQUAD8	1701	701	2257	2252	2251	2233	2507	2501	+1701
+1701	2506	2512					99.5		
CQUAD8	1702	702	2252	2257	2258	2253	2507	2513	+1702
+1702	2508	2502					99.5		
CQUAD8	1703	703	2253	2258	2259	2254	2508	2514	+1703
+1703	2509	2503					99.5		
CQUAD8	1704	704	2254	2259	2260	2255	2509	2515	+1704
+1704	2510	2504					99.5		
CQUAD8	1705	705	2255	2260	2261	2256	2510	2516	+1705
+1705	2511	2505					99.5		
CQUAD8	1707	707	2257	2262	2263	2258	2518	2523	+1707
+1707	2519	2513					99.5		
CQUAD8	1708	708	2258	2263	2264	2259	2519	2524	+1708
+1708	2520	2514					99.5		
CQUAD8	1709	709	2259	2264	2265	2260	2520	2525	+1709
+1709	2521	2515					99.5		
CQUAD8	1710	710	2260	2265	2266	2261	2521	2526	+1710
+1710	2522	2516					99.5		
CSHEAR	71	71	1034	1040	1037	1031			
CSHEAR	72	72	1040	1048	1045	1037			
CSHEAR	73	73	1048	1057	1054	1045			
CSHEAR	74	74	1057	1069	1066	1054			
CSHEAR	75	75	1069	1082	1121	1066			
CSHEAR	76	76	1094	1079	1114	1121			
CSHEAR	77	71	2034	2040	2037	2031			
CSHEAR	78	72	2040	2048	2045	2037			
CSHEAR	79	73	2048	2057	2054	2045			
CSHEAR	80	74	2057	2069	2066	2054			
CSHEAR	81	75	2069	2082	2121	2066			
CSHEAR	82	76	2094	2079	2114	2121			
CSHEAR	201	201	1465	1464	1466	1467			
CSHEAR	202	202	1275	1276	1464	1465			
CSHEAR	203	203	1280	1290	1276	1275			
CSHEAR	204	204	1114	1079	1293	1292			
CSHEAR	205	201	2465	2464	2466	2467			
CSHEAR	206	202	2275	2276	2464	2465			
CSHEAR	207	203	2280	2290	2276	2275			
CSHEAR	208	204	2114	2079	2293	2292			
CSHEAR	642	642	1075	1088	1087	1074			
CSHEAR	646	646	1074	1087	1086	1073			
CSHEAR	650	650	1073	1086	1085	1072			
CSHEAR	651	651	1007	1018	1016	1006			
CSHEAR	652	652	1006	1016	1180	1176			
CSHEAR	653	653	1176	1180	1014	1005			
CSHEAR	654	654	1005	1014	1179	1175			
CSHEAR	655	655	1175	1179	1012	1004			
CSHEAR	656	656	1004	1012	1178	1174			
CSHEAR	657	657	1174	1178	1010	1003			
CSHEAR	658	658	1003	1010	1177	1173			
CSHEAR	659	659	1173	1177	1194	1002			
CSHEAR	660	660	1002	1194	1008	1001			
CSHEAR	1642	642	2075	2088	2087	2074			
CSHEAR	1646	646	2074	2087	2086	2073			
CSHEAR	1650	650	2073	2086	2085	2072			
CSHEAR	1651	651	2007	2018	2016	2006			
CSHEAR	1652	652	2006	2016	2180	2176			
CSHEAR	1653	653	2176	2180	2014	2005			
CSHEAR	1654	654	2005	2014	2179	2175			
CSHEAR	1655	655	2175	2179	2012	2004			
CSHEAR	1656	656	2004	2012	2178	2174			
CSHEAR	1657	657	2174	2178	2010	2003			
CSHEAR	1658	658	2003	2010	2177	2173			
CSHEAR	1659	659	2173	2177	2194	2002			
CSHEAR	1660	660	2002	2194	2008	2001			
CSHEAR	3158	3158	3091	3092	3094	3093			
CSHEAR	3159	3158	3095	3096	3098	3097			
CTRIA3	606	606	1032	1038	1030				
CTRIA3	612	612	1181	1182	1029				
CTRIA3	617	617	1029	1044	1027				
CTRIA3	622	622	1187	1188	1026				
CTRIA3	626	626	1026	1052	1025				
CTRIA3	629	629	1064	1245	1063				
CTRIA3	630	630	1064	1077	1245				
CTRIA3	631	631	1077	1076	1245				
CTRIA3	636	636	1051	1023	1024				
CTRIA3	637	637	1051	1022	1023				
CTRIA3	638	638	1062	1022	1051				
CTRIA3	647	647	1019	1020	1060				
CTRIA3	1606	606	2032	2038	2030				
CTRIA3	1612	612	2181	2182	2029				
CTRIA3	1617	617	2029	2044	2027				
CTRIA3	1622	622	2187	2188	2026				
CTRIA3	1626	626	2026	2052	2025				
CTRIA3	1629	629	2064	2245	2063				
CTRIA3	1630	630	2064	2077	2245				
CTRIA3	1631	631	2077	2076	2245				
CTRIA3	1636	636	2051	2023	2024				
CTRIA3	1637	637	2051	2022	2023				
CTRIA3	1638	638	2062	2022	2051				
CTRIA3	1647	647	2019	2020	2060				
CTRIA6	706	706	1262	1257	1233	1518	1512	1517	+706
+706	99.5								
CTRIA6	1706	706	2262	2257	2233	2518	2512	2517	+1706
+1706	99.5								
DMIG	VTAIL	0	6	1	0				
DMIG	*VTAIL		357		1				*9001
*9001	357		1		0.127440E+06				
DMIG	*VTAIL		358		1				*9002
*9002	357		1		-.217072E+05				*9003
*9003	358		1		0.680871E+05				
DMIG	*VTAIL		359		1				*9004
*9004	357		1		0.352175E+03				*9005
*9005	358		1		-.193333E+05				*9006
*9006	359		1		0.717224E+05				
DMIG	*VTAIL		360		1				*9007
*9007	357		1		0.456481E+03				*9008
*9008	358		1		-.301624E+03				*9009
*9009	359		1		-.903472E+04				*9010
*9010	360		1		0.507642E+05				
DMIG	*VTAIL		361		1				*9011
*9011	357		1		-.131707E+02				*9012
*9012	358		1		0.315215E+03				*9013
*9013	359		1		-.103102E+04				*9014
*9014	360		1		-.504458E+04				*9015
*9015	361		1		0.468148E+05				
DMIG	*VTAIL		362		1				*9016
*9016	357		1		0.739752E+00				*9017
*9017	358		1		-.313943E+02				*9018
*9018	359		1		0.841453E+02				*9019
*9019	360		1		0.764191E+02				*9020
*9020	361		1		-.117072E+05				*9021
*9021	362		1		0.484915E+05				
DMIG	*VTAIL		363		1				*9022
*9022	357		1		0.363626E+00				*9023
*9023	358		1		-.206621E+01				*9024
*9024	359		1		0.170371E+02				*9025
*9025	360		1		-.128679E+03				*9026
*9026	361		1		0.142936E+04				*9027
*9027	362		1		-.141053E+05				*9028

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*9028   363     1       0.334950E+05
DMIG    *VTAIL  364     1                    *9029
*9029   357     1       -.178665E+00         *9030
*9030   358     1       0.286879E+01         *9031
*9031   359     1       -.179730E+02         *9032
*9032   360     1       0.822153E+02         *9033
*9033   361     1       -.308830E+03         *9034
*9034   362     1       0.163581E+04         *9035
*9035   363     1       -.934300E+04         *9036
*9036   364     1       0.133364E+05
DMIG    *VTAIL  367     1                    *9037
*9037   357     1       0.156429E+04         *9038
*9038   358     1       -.126722E+05         *9039
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*9042   362     1       -.348368E+01         *9043
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*9044   364     1       0.287588E+00         *9045
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DMIG    *VTAIL  368     1                    *9046
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*9050   361     1       0.413201E+03         *9051
*9051   362     1       -.489800E+02         *9052
*9052   363     1       -.271009E+00         *9053
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*9054   367     1       -.502776E+04         *9055
*9055   368     1       0.246725E+05
DMIG    *VTAIL  369     1                    *9056
*9056   357     1       0.292477E+03         *9057
*9057   358     1       0.106678E+04         *9058
*9058   359     1       -.372974E+04         *9059
*9059   360     1       -.163066E+05         *9060
*9060   361     1       -.720338E+03         *9061
*9061   362     1       0.400484E+03         *9062
*9062   363     1       0.516836E+00         *9063
*9063   364     1       -.141972E+02         *9064
*9064   367     1       0.245134E+03         *9065
*9065   368     1       -.625047E+04         *9066
*9066   369     1       0.208907E+05
DMIG    *VTAIL  370     1                    *9067
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*9068   358     1       -.429165E+02         *9069
*9069   359     1       0.371999E+03         *9070
*9070   360     1       -.238343E+04         *9071
*9071   361     1       -.147446E+05         *9072
*9072   362     1       0.690143E+03         *9073
*9073   363     1       0.723676E+03         *9074
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*9075   367     1       -.574195E+02         *9076
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*9081   359     1       0.537074E+02         *9082
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*9084   362     1       -.131301E+05         *9085
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*9087   367     1       0.123231E+02         *9088
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DMIG    *VTAIL  372     1                    *9092
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DMIG    *VTAIL  376     1                    *9137
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DMIG    *VTAIL  380     1                    *9211
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*9244	371	1	-.460481E+02	*9245
*9245	372	1	0.878765E+02	*9246
*9246	373	1	0.449404E+03	*9247
*9247	375	1	0.842499E+01	*9248
*9248	376	1	-.320128E+02	*9249
*9249	377	1	0.773381E+02	*9250
*9250	378	1	-.617478E+03	*9251
*9251	379	1	0.379035E+04	*9252
*9252	380	1	-.113558E+05	*9253
*9253	381	1	0.131793E+05	
DMIG	*VTAIL	382	1	*9254
*9254	357	1	-.211797E-02	*9255
*9255	358	1	0.196775E-01	*9256
*9256	359	1	-.154809E+00	*9257
*9257	360	1	0.835219E+00	*9258
*9258	361	1	0.461861E+01	*9259
*9259	362	1	0.180099E+02	*9260
*9260	363	1	0.393001E+02	*9261
*9261	364	1	0.813303E+03	*9262
*9262	367	1	0.352611E-02	*9263
*9263	368	1	-.218807E-01	*9264
*9264	369	1	0.135616E+00	*9265
*9265	370	1	0.447717E+01	*9266
*9266	371	1	0.122064E+02	*9267
*9267	372	1	0.882424E+01	*9268
*9268	373	1	-.479232E+02	*9269
*9269	375	1	0.117696E+00	*9270
*9270	376	1	-.551862E+00	*9271
*9271	377	1	0.991771E+00	*9272
*9272	378	1	-.439420E+01	*9273
*9273	379	1	-.139387E+03	*9274
*9274	380	1	0.164894E+04	*9275
*9275	381	1	-.475810E+03	*9276
*9276	382	1	0.179643E+04	
DMIG	*VTAIL	383	1	*9277
*9277	357	1	0.311274E-03	*9278
*9278	358	1	-.479934E-02	*9279
*9279	359	1	0.182106E-01	*9280
*9280	360	1	-.183852E+00	*9281
*9281	361	1	-.116182E+01	*9282
*9282	362	1	-.255904E+01	*9283
*9283	363	1	0.112750E+01	*9284
*9284	364	1	-.358622E+02	*9285
*9285	367	1	-.179107E-02	*9286
*9286	368	1	0.109064E-01	*9287
*9287	369	1	-.797350E-01	*9288
*9288	370	1	-.865236E+00	*9289
*9289	371	1	-.258086E+01	*9290
*9290	372	1	-.318473E+01	*9291
*9291	373	1	-.249386E+01	*9292
*9292	375	1	0.754849E-01	*9293
*9293	376	1	-.271080E+00	*9294
*9294	377	1	0.703442E+00	*9295
*9295	378	1	-.611849E+01	*9296
*9296	379	1	0.611220E+02	*9297
*9297	380	1	0.131850E+04	*9298
*9298	381	1	-.653645E+03	*9299
*9299	382	1	-.643881E+03	*9300
*9300	383	1	0.830302E+03	
DMIG	*VTAIL	384	1	*9301
*9301	357	1	0.265363E+05	*9302
*9302	358	1	0.282354E+05	*9303
*9303	359	1	-.948610E+04	*9304
*9304	360	1	-.219314E+04	*9305
*9305	361	1	-.475010E+03	*9306
*9306	362	1	0.553337E+02	*9307
*9307	363	1	0.194540E+01	*9308
*9308	364	1	-.384202E+01	*9309
*9309	367	1	0.284832E+04	*9310
*9310	368	1	-.116448E+04	*9311
*9311	369	1	-.338989E+04	*9312
*9312	370	1	-.157428E+03	*9313
*9313	371	1	0.485381E+02	*9314
*9314	372	1	-.926415E+01	*9315
*9315	373	1	-.122039E+01	*9316
*9316	375	1	-.569831E+06	*9317
*9317	376	1	-.948471E+05	*9318
*9318	377	1	-.370924E+04	*9319
*9319	378	1	-.157310E+03	*9320
*9320	379	1	0.111069E+03	*9321
*9321	380	1	-.182484E+02	*9322
*9322	381	1	0.664130E+01	*9323
*9323	382	1	0.991842E-01	*9324
*9324	383	1	0.593778E-01	*9325
*9325	384	1	0.149748E+07	
DMIG	*VTAIL	385	1	*9326
*9326	357	1	0.710800E+01	*9327
*9327	358	1	0.285959E+03	*9328
*9328	359	1	-.443238E+03	*9329
*9329	360	1	0.490161E+04	*9330
*9330	361	1	-.323369E+03	*9331
*9331	362	1	0.898562E+02	*9332
*9332	363	1	-.795076E+01	*9333
*9333	364	1	-.406666E+01	*9334
*9334	367	1	0.952642E+02	*9335
*9335	368	1	0.256148E+03	*9336
*9336	369	1	0.903557E+03	*9337
*9337	370	1	0.597779E+03	*9338
*9338	371	1	0.124134E+03	*9339
*9339	372	1	-.470681E+01	*9340
*9340	373	1	-.373270E+00	*9341
*9341	375	1	-.139221E+04	*9342
*9342	376	1	-.419824E+03	*9343
*9343	377	1	-.351213E+05	*9344
*9344	378	1	-.580778E+03	*9345
*9345	379	1	0.515640E+02	*9346
*9346	380	1	0.268160E+01	*9347
*9347	381	1	-.203257E+01	*9348
*9348	382	1	-.981071E-01	*9349
*9349	383	1	-.714582E-02	*9350
*9350	384	1	-.269212E+04	*9351
*9351	385	1	0.349451E+05	
DMIG	*VTAIL	386	1	*9352
*9352	357	1	0.106815E+00	*9353
*9353	358	1	-.224760E+02	*9354
*9354	359	1	0.196095E+03	*9355
*9355	360	1	-.359483E+03	*9356
*9356	361	1	0.606719E+04	*9357
*9357	362	1	0.281741E+03	*9358
*9358	363	1	0.117268E+03	*9359
*9359	364	1	0.195964E+02	*9360
*9360	367	1	-.452626E+00	*9361
*9361	368	1	0.496996E+02	*9362
*9362	369	1	0.352965E+03	*9363
*9363	370	1	-.142282E+03	*9364
*9364	371	1	0.322191E+03	*9365
*9365	372	1	0.854219E+02	*9366
*9366	373	1	0.160192E+02	*9367
*9367	375	1	0.323717E+03	*9368
*9368	376	1	-.318383E+02	*9369
*9369	377	1	-.420586E+03	*9370
*9370	378	1	-.314870E+05	*9371
*9371	379	1	-.689858E+03	*9372
*9372	380	1	0.423422E+01	*9373
*9373	381	1	0.102897E+02	*9374
*9374	382	1	0.527408E+00	*9375
*9375	383	1	0.337155E-01	*9376
*9376	384	1	0.643374E+03	*9377
*9377	385	1	-.357044E+04	*9378
*9378	386	1	0.322247E+05	
DMIG	*VTAIL	387	1	*9379
*9379	357	1	-.338835E+00	*9380
*9380	358	1	-.546516E-01	*9381
*9381	359	1	0.188194E+00	*9382
*9382	360	1	0.399533E-01	*9383
*9383	361	1	0.777587E-02	*9384
*9384	362	1	-.905881E-03	*9385
*9385	363	1	0.475235E-04	*9386
*9386	364	1	0.368288E-04	*9387
*9387	367	1	-.149039E-01	*9388
*9388	368	1	0.885053E-01	*9389
*9389	369	1	0.672132E-01	*9390
*9390	370	1	0.462911E-02	*9391
*9391	371	1	-.849053E-03	*9392
*9392	372	1	0.795566E-04	*9393
*9393	373	1	0.977434E-05	*9394
*9394	375	1	-.960622E+02	*9395
*9395	376	1	0.984160E+00	*9396
*9396	377	1	0.481161E-01	*9397
*9397	378	1	-.891686E-03	*9398
*9398	379	1	-.753510E-03	*9399
*9399	380	1	-.204675E-04	*9400
*9400	381	1	0.508574E-05	*9401
*9401	382	1	-.608804E-07	*9402
*9402	383	1	0.551832E-07	*9403
*9403	384	1	-.178513E+03	*9404
*9404	385	1	0.105938E+04	*9405
*9405	386	1	-.419783E+04	*9406
*9406	387	1	0.497765E+04	
DMIG	*VTAIL	388	1	*9407
*9407	357	1	0.396140E-01	*9408
*9408	358	1	-.883404E-01	*9409
*9409	359	1	0.845446E+00	*9410
*9410	360	1	-.468879E+01	*9411
*9411	361	1	0.502871E+02	*9412
*9412	362	1	0.250159E+03	*9413
*9413	363	1	0.874634E+04	*9414
*9414	364	1	0.134833E+04	*9415
*9415	367	1	0.310222E-01	*9416
*9416	368	1	-.236734E+00	*9417
*9417	369	1	0.235626E+01	*9418
*9418	370	1	0.161871E+02	*9419
*9419	371	1	0.211136E+02	*9420
*9420	372	1	-.961292E+03	*9421
*9421	373	1	0.278446E+03	*9422
*9422	375	1	0.102905E+02	*9423
*9423	376	1	-.286084E+01	*9424
*9424	377	1	0.459790E+01	*9425
*9425	378	1	-.225652E+02	*9426
*9426	379	1	-.362756E+03	*9427
*9427	380	1	-.513037E+05	*9428
*9428	381	1	-.124016E+04	*9429
*9429	382	1	-.303660E+04	*9430
*9430	383	1	-.859051E+03	*9431
*9431	384	1	0.185899E+02	*9432
*9432	385	1	-.106061E+03	*9433
*9433	386	1	0.590076E+03	*9434
*9434	387	1	-.160275E+04	*9435
*9435	388	1	0.483130E+05	
DMIG	*VTAIL	389	1	*9436
*9436	357	1	0.103213E+02	*9437
*9437	358	1	0.166475E+01	*9438
*9438	359	1	-.573260E+01	*9439
*9439	360	1	-.121702E+01	*9440
*9440	361	1	-.236861E+00	*9441
*9441	362	1	0.275941E-01	*9442
*9442	363	1	-.144762E-02	*9443
*9443	364	1	-.112184E-02	*9444
*9444	367	1	0.453988E+00	*9445
*9445	368	1	-.269597E+01	*9446
*9446	369	1	-.204739E+01	*9447
*9447	370	1	-.141008E+00	*9448
*9448	371	1	0.258631E-01	*9449
*9449	372	1	-.242338E-02	*9450
*9450	373	1	-.297737E-03	*9451
*9451	375	1	0.292616E+04	*9452
*9452	376	1	-.299786E+02	*9453
*9453	377	1	-.146567E+01	*9454
*9454	378	1	0.271617E-01	*9455
*9455	379	1	0.229527E-01	*9456
*9456	380	1	0.623463E-03	*9457
*9457	381	1	-.154917E-03	*9458
*9458	382	1	0.185448E-05	*9459
*9459	383	1	-.168094E-05	*9460
*9460	384	1	-.237751E+04	*9461

+9461	385	1	0.187243E+04	+9462
+9462	386	1	0.147890E+03	+9463
+9463	387	1	-.464456E+02	+9464
+9464	388	1	0.463955E+01	+9465
+9465	389	1	0.507054E+04	
DMIG	+VTAIL	390	1	+9466
+9466	384	1	0.243494E+04	+9467
+9467	385	1	-.408017E+04	+9468
+9468	386	1	0.137165E+04	+9469
+9469	389	1	-.414326E+04	+9470
+9470	390	1	0.591447E+04	
DMIG	+VTAIL	391	1	+9471
+9471	385	1	0.137165E+04	+9472
+9472	386	1	-.273356E+04	+9473
+9473	387	1	0.123460E+04	+9474
+9474	389	1	0.729919E+02	+9475
+9475	390	1	-.160803E+04	+9476
+9476	391	1	0.320895E+04	
DMIG	+VTAIL	392	1	+9477
+9477	386	1	0.123460E+04	+9478
+9478	387	1	-.183606E+04	+9479
+9479	388	1	0.532735E+03	+9480
+9480	389	1	-.270690E+02	+9481
+9481	390	1	0.120338E+03	+9482
+9482	391	1	-.161773E+04	+9483
+9483	392	1	0.207529E+04	
DMIG	+VTAIL	393	1	+9484
+9484	387	1	0.571031E+03	+9485
+9485	388	1	-.673689E+03	+9486
+9486	389	1	0.223540E+01	+9487
+9487	390	1	-.993771E+01	+9488
+9488	391	1	0.711305E+02	+9489
+9489	392	1	-.482110E+03	+9490
+9490	393	1	0.521340E+03	
DMIG	+VTAIL	406	1	+9491
+9491	357	1	-.173625E+05	+9492
+9492	358	1	-.280045E+04	+9493
+9493	359	1	0.964342E+04	+9494
+9494	360	1	0.204728E+04	+9495
+9495	361	1	0.398450E+03	+9496
+9496	362	1	-.464190E+02	+9497
+9497	363	1	0.243519E+01	+9498
+9498	364	1	0.188718E+01	+9499
+9499	367	1	-.763702E+03	+9500
+9500	368	1	0.453518E+04	+9501
+9501	369	1	0.344413E+04	+9502
+9502	370	1	0.237204E+03	+9503
+9503	371	1	-.435070E+02	+9504
+9504	372	1	0.407663E+01	+9505
+9505	373	1	0.500855E+00	+9506
+9506	375	1	-.443406E+06	+9507
+9507	376	1	0.504302E+05	+9508
+9508	377	1	0.246556E+04	+9509
+9509	378	1	-.456917E+02	+9510
+9510	379	1	-.386113E+02	+9511
+9511	380	1	-.104880E+01	+9512
+9512	381	1	0.260603E+00	+9513
+9513	382	1	-.311963E-02	+9514
+9514	383	1	0.282769E-02	+9515
+9515	384	1	-.968350E+06	+9516
+9516	385	1	0.197004E+04	+9517
+9517	386	1	-.358031E+03	+9518
+9518	387	1	0.100278E+03	+9519
+9519	388	1	-.101088E+02	+9520
+9520	389	1	-.305457E+04	+9521
+9521	406	1	0.176490E+07	
DMIG	+VTAIL	407	1	+9554
+9554	357	1	-.911903E+05	+9555
+9555	358	1	0.728130E+04	+9556
+9556	359	1	0.231467E+03	+9557
+9557	360	1	-.841305E+02	+9558
+9558	361	1	0.529257E+01	+9559
+9559	362	1	-.984070E+00	+9560
+9560	363	1	0.155806E+00	+9561
+9561	364	1	0.153670E-01	+9562
+9562	367	1	-.501667E+05	+9563
+9563	368	1	0.663999E+03	+9564
+9564	369	1	-.918211E+02	+9565
+9565	370	1	-.938795E+00	+9566
+9566	371	1	0.891667E+00	+9567
+9567	372	1	-.955200E+00	+9568
+9568	373	1	0.604210E-01	+9569
+9569	375	1	-.290253E+04	+9570
+9570	376	1	0.464443E+03	+9571
+9571	377	1	0.589231E+02	+9572
+9572	378	1	0.925670E+00	+9573
+9573	379	1	0.568770E+00	+9574
+9574	380	1	-.965196E-01	+9575
+9575	381	1	0.253072E-01	+9576
+9576	382	1	0.225246E-03	+9577
+9577	383	1	0.233053E-03	+9578
+9578	384	1	0.675815E+04	+9579
+9579	385	1	-.939438E+00	+9580
+9580	386	1	0.715953E+00	+9581
+9581	387	1	-.379983E-01	+9582
+9582	388	1	0.102725E-01	+9583
+9583	389	1	0.115747E+01	+9584
+9584	406	1	-.194711E+04	+9585
+9585	407	5	0.676867E+06	+9586
+9586	407	1	0.122983E+06	
DMIG	+VTAIL	407	5	+9522
+9522	357	1	0.191080E+06	+9523
+9523	358	1	-.356714E+05	+9524
+9524	359	1	-.280960E+05	+9525
+9525	360	1	-.160270E+04	+9526
+9526	361	1	-.918511E+02	+9527
+9527	362	1	-.156290E+02	+9528
+9528	363	1	0.105740E+02	+9529
+9529	364	1	-.110634E+01	+9530
+9530	367	1	-.804513E+06	+9531
+9531	368	1	-.532051E+05	+9532
+9532	369	1	-.187041E+04	+9533
+9533	370	1	-.364230E+03	+9534
+9534	371	1	0.204481E+03	+9535

+9535	372	1	-.111039E+03	+9536
+9536	373	1	0.574412E+01	+9537
+9537	375	1	-.181739E+05	+9538
+9538	376	1	0.814804E+04	+9539
+9539	377	1	0.725627E+02	+9540
+9540	378	1	0.203894E+03	+9541
+9541	379	1	0.126076E+02	+9542
+9542	380	1	-.261081E+01	+9543
+9543	381	1	0.555171E+00	+9544
+9544	382	1	0.415987E-02	+9545
+9545	383	1	0.517604E-02	+9546
+9546	384	1	0.106276E+05	+9547
+9547	385	1	-.226352E+02	+9548
+9548	386	1	0.519700E+02	+9549
+9549	387	1	0.257476E+00	+9550
+9550	388	1	0.673053E+00	+9551
+9551	389	1	-.784298E+01	+9552
+9552	406	1	0.131935E+05	+9553
+9553	407	5	0.195301E+08	
DMIG	+VTAIL	408	1	+9587
+9587	357	1	0.744264E+03	+9588
+9588	358	1	0.120044E+03	+9589
+9589	359	1	-.413376E+03	+9590
+9590	360	1	-.877589E+02	+9591
+9591	361	1	-.170800E+02	+9592
+9592	362	1	0.198980E+01	+9593
+9593	363	1	-.104387E+00	+9594
+9594	364	1	-.808958E-01	+9595
+9595	367	1	0.327369E+02	+9596
+9596	368	1	-.194405E+03	+9597
+9597	369	1	-.147636E+03	+9598
+9598	370	1	-.101680E+02	+9599
+9599	371	1	0.186498E+01	+9600
+9600	372	1	-.174749E+00	+9601
+9601	373	1	-.214697E-01	+9602
+9602	375	1	0.211004E+06	+9603
+9603	376	1	-.216175E+04	+9604
+9604	377	1	-.105689E+03	+9605
+9605	378	1	0.195862E+01	+9606
+9606	379	1	0.165511E+01	+9607
+9607	380	1	0.449577E-01	+9608
+9608	381	1	-.111710E-01	+9609
+9609	382	1	0.133726E-03	+9610
+9610	383	1	-.121212E-03	+9611
+9611	384	1	0.418267E+05	+9612
+9612	385	1	0.214221E+03	+9613
+9613	386	1	-.445492E+02	+9614
+9614	387	1	0.145153E+02	+9615
+9615	388	1	-.144600E+01	+9616
+9616	389	1	-.442150E+03	+9617
+9617	406	1	-.361694E+06	+9618
+9618	407	5	-.565555E+03	+9619
+9619	407	1	0.834648E+02	+9620
+9620	408	1	0.109547E+06	
DMIG	+VTAIL	409	1	+9656
+9656	357	1	-.262206E+05	+9657
+9657	358	1	-.103588E+04	+9658
+9658	359	1	0.214164E+04	+9659
+9659	360	1	0.293531E+03	+9660
+9660	361	1	0.269486E+02	+9661
+9661	362	1	-.242846E+01	+9662
+9662	363	1	0.525678E-01	+9663
+9663	364	1	0.172746E+00	+9664
+9664	367	1	0.323348E+04	+9665
+9665	368	1	0.215706E+04	+9666
+9666	369	1	0.503979E+03	+9667
+9667	370	1	0.246870E+02	+9668
+9668	371	1	-.255333E+01	+9669
+9669	372	1	0.824261E+00	+9670
+9670	373	1	0.127325E-01	+9671
+9671	375	1	-.458756E+05	+9672
+9672	376	1	0.207304E+03	+9673
+9673	377	1	0.280582E+02	+9674
+9674	378	1	-.203789E+02	+9675
+9675	379	1	-.339806E+01	+9676
+9676	380	1	-.120555E+00	+9677
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+9679	383	1	0.414972E-03	+9680
+9680	384	1	0.520328E+05	+9681
+9681	385	1	0.124228E+01	+9682
+9682	386	1	-.178476E+01	+9683
+9683	387	1	-.785608E+00	+9684
+9684	388	1	0.666356E-01	+9685
+9685	389	1	0.239304E+02	+9686
+9686	406	1	-.402560E+05	+9687
+9687	407	5	0.438355E+05	+9688
+9688	407	1	0.785184E+04	+9689
+9689	408	1	0.172562E+04	+9690
+9690	409	5	0.179613E+06	+9691
+9691	409	1	0.431661E+05	
DMIG	+VTAIL	409	5	+9621
+9621	357	1	-.108056E+06	+9622
+9622	358	1	-.369272E+04	+9623
+9623	359	1	-.168866E+05	+9624
+9624	360	1	-.236393E+04	+9625
+9625	361	1	-.229630E+03	+9626
+9626	362	1	0.221145E+02	+9627
+9627	363	1	-.744120E+00	+9628
+9628	364	1	-.145670E+01	+9629
+9629	367	1	-.615575E+04	+9630
+9630	368	1	-.153980E+05	+9631
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+9636	375	1	-.145521E+06	+9637
+9637	376	1	-.194645E+04	+9638
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+9639	378	1	0.145115E+03	+9640
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+9641	380	1	0.128482E+01	+9642
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*9648   387             1               0.503546E+01            +9649
*9649   388             1               -.432889E+00            +9650
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*9651   406             1               0.258026E+06            +9652
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*9653   407             1               0.627816E+05            +9654
*9654   408             1               -.110606E+05            +9655
*9655   409             5               0.437083E+07
EIGR    1       MGIV    0.      30.                             +EIG1
+EIG1   MAX
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GRID    2       5       -131.7509.602   .000    0
GRID    3       5       -100.75011.331  .000    0
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GRID    5       5       -40.750 14.678  .000    0
GRID    6       5       0.000   17.047  .000    0
GRID    7       5       24.947  18.341  .000    0
GRID    8       5       -141.0943.076   .000    0
GRID    9       0       -170.615-371.062.000    5
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GRID    14      5       -40.750 3.763   .000    0
GRID    15      0       -96.682 -318.006.000    5
GRID    16      5       0.000   4.054   .000    0
GRID    17      0       -63.574 -294.247.000    5
GRID    18      5       14.758  4.143   .000    0
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GRID    20      0       -168.385-374.169.000    1
GRID    21      0       -157.000-366.154.000    0
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GRID    29      0       -86.000 -316.174.000    0
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GRID    31      0       -41.500 -293.800.000    0
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GRID    33      0       -41.500 -293.800.000    0
GRID    34      0       -25.500 -293.800.000    0
GRID    35      0       -25.500 -293.800.000    0
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GRID    45      0       -41.500 -324.500.000    0
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MAT1    2       10.5E6  4.0E6
MAT1    3       .99999E8.99999E8
MAT1    4       10.5E6  .99999E8
MAT1    5       10.5E6  4.400E6
MAT1    601     3.150E6 4.400E6
MAT1    606     6.825E6 4.400E6
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MAT2    703     6618000.2464000.-254500.8980000.-254500.2625000.
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MAT2    705     6047000.2622000.-109000.9502000.-109000.2783000.
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PBEAM   38      2       1.970   9999.0  251.45          .01             +38
+38     NO      1.0     .950            49.35
PBEAM   39      2       4.140   9999.0  323.80                          +39
+39     NO      1.0     2.140           123.20
PBEAM   40      2       4.140   9999.0  284.10                          +40
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PBEAM   41      2       5.590   9999.0  376.40                          +41
+41     NO      1.0     2.834           124.70
PBEAM   42      2       3.942   9999.0  379.30                          +42
+42     NO      1.0     2.088           112.40
PBEAM   43      2       2.886   9999.0  350.15                          +43
+43     NO      1.0     2.340           293.75
PBEAM   44      2       2.340   9999.0  293.75                          +44
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+45     NO      1.0     1.521           76.375
PBEAM   46      2       2.250   9999.0  215.00          .001            +46
+46     NO      1.0     2.250           162.00
PBEAM   47      2       2.250   9999.0  162.00                          +47
+47     NO      1.0     1.875           133.00
PBEAM   48      2       1.875   9999.0  133.00                          +48
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+51     NO      1.0     1.371           53.59                           +51A
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+146A   0.      1.              -.0269
PBEAM   147     2       1.017   1.      34.25           .001            +147
+147    NO      1.0     1.620           103.19                          +147A
+147A   0.      1.              -.4573
PBEAM   148     2       1.500   1.      24.08           .001            +148
+148    NO      1.0     1.875           39.37                           +148A
+148A   0.      1.              -.2222
PBEAM   149     2       1.875   1.      39.37           .001            +149
+149    NO      1.0     2.250           59.52                           +149A
+149A   0.      1.              -.1818
PBEAM   150     2       1.125   1.      44.13           .001            +150
+150    NO      1.0     1.538           87.37                           +150A
+150A   0.      1.              -.3099
PBEAM   151     2       1.538   1.      86.52           .001            +151
+151    NO      1.0     1.750           115.17                          +151A
+151A   0.      1.              -.1293
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+152    NO      1.0     1.750           115.17                          +152A
+152A   0.      1.              .0000
PBEAM   153     2       14.000  1.      129.80          .001            +153
+153    NO      1.0     14.000          129.80                          +153A
+153A   0.      1.              .0000
PBEAM   154     2       14.000  1.      79.18           .001            +154
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PBEAM   160     2       30.000  .001    .001            .001            +160
+160    NO      1.0     30.000                                          +160A
+160A   0.      1.              .0000
PBEAM   161     2       1980.0001.      9999.00         .001            +161
+161    NO      1.0     2970.000        9999.00                         +161A
+161A   0.      1.              .0000
PBEAM   162     2       2970.0001.      9999.00         .001            +162
+162    NO      1.0     1782.000        47.10                           +162A
+162A   0.      1.              .0000
PBEAM   163     2       1.080   1.      121.33          .001            +163
+163    NO      1.0     1.080           99.73                           +163A
+163A   0.      1.              .0000
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+164    NO      1.0     2970.000        9999.00                         +164A
+164A   0.      1.              .0000
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+165    NO      1.0     1980.000        9999.00                         +165A
+165A   0.      1.              .0000
PBEAM   166     2       .840    1.      181.16          .001            +166
+166    NO      1.0     .678            115.24                          +166A
+166A   0.      1.              .2134
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PBEAM   168     2       1.400   1.      239.03          .001            +168
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PBEAM   170     2       3.210   1.      20.00           .001            +170
+170    NO      1.0     3.300           20.00                           +170A
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+171    NO      1.0     1980.000        9999.00                         +171A
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PBEAM   172     2       1.230   1.      84.87           .001            +172
+172    NO      1.0     1.000           57.12                           +172A
+172A   0.      1.              .2063
PBEAM   173     2       1.125   1.      41.92           .001            +173
+173    NO      1.0     1.188           46.53                           +173A
+173A   0.      1.              -.0541
PBEAM   174     2       .750    1.      12.63           .001            +174
+174    NO      1.0     1.063           23.78                           +174A
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PBEAM   175     2       1059.3001.      9999.00         .001            +175
+175    NO      1.0     841.500         9999.00                         +175A
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+177A   0.      1.              .0000
PBEAM   178     2       82.000  1.      29.71           .001            +178
+178    NO      1.0     85.000          29.71                           +178A
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+179    NO      1.0     90.000
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+180    NO      1.0     55.800          31.90
PBEAM   181     2       990.000 1.      9999.00         .001            +181
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PBEAM   182     2       990.000 1.      9999.00         .001            +182
+182    NO      1.0
PBEAM   1001    2       1.34778 1.      14.325                          +1001
+1001   NO      1.      1.32951         14.209                          +1001A
+1001A  0.      1.              1.36-2
PBEAM   1002    2       1.32951 1.      14.209                          +1002
+1002   NO      1.      1.23648         13.640                          +1002A
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PBEAM   1003    2       1.23648 1.      13.640                          +1003
+1003   NO      1.      1.09137         12.836                          +1003A
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PBEAM   1004    2       1.09137 1.      12.836                          +1004
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+1009   NO      1.      0.05704                                         +1009A
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+1111   NO      1.      0.1264          1.156                           +1111A
+1111A  0.      1.              .218
PBEAM   1112    2       0.1728  1.      .303                            +1112
+1112   NO      1.      0.16064         .262                            +1112A
+1112A  0.      1.              7.29-2
PBEAM   1113    2       0.16064 1.      .222                            +1113
+1113   NO      1.      0.13784         .163                            +1113A
+1113A  0.      1.              .153
PBEAM   1114    2       0.13784 1.      .148                            +1114
+1114   NO      1.      0.12232         .117                            +1114A
+1114A  0.      1.              .119
PBEAM   1115    2       0.12232 1.      .117                            +1115
+1115   NO      1.      0.108           .991                            +1115A
+1115A  0.      1.              .124
PBEAM   1116    2       .337714 1.      19.909                          +1116
+1116   NO      1.      .312716         19.868                          +1116A
+1116A  0.      1.              7.69-2
PBEAM   1117    2       0.85918 1.      3.590                           +1117
+1117   NO      1.      0.77384         3.626                           +1117A
+1117A  0.      1.              .105
PBEAM   1118    2       0.54624 1.      6.20                            +1118
+1118   NO      1.      0.49872         2.937                           +1118A
+1118A  0.      1.              9.10-2
PBEAM   1119    2       0.39482 1.      1.371                           +1119
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+1119   NO      1.      0.35112         1.197                           +1119A
+1119A  0.      1.              .117
PBEAM   1120    2       0.31416 1.      1.796                           +1120
+1120   NO      1.      0.27047         1.622                           +1120A
+1120A  0.      1.              .149
PBEAM   1121    2       0.36593 1.      .570                            +1121
+1121   NO      1.      0.32453         .448                            +1121A
+1121A  0.      1.              .120
PBEAM   1122    2       0.23987 1.      .388                            +1122
+1122   NO      1.      0.2193          .324                            +1122A
+1122A  0.      1.              8.96-2
PBEAM   1123    2       2.193   1.      0.577                           +1123
+1123   NO      1.      1.7255          0.319                           +1123A
+1123A  0.      1.              .239
PBEAM   1124    2       1.7255  .1      0.319                           +1124
+1124   NO      1.      1.411           0.186                           +1124A
+1124A  0.      1.              .201
PBEAM   1125    2       1.411   1.      0.186                           +1125
+1125   NO      1.      1.122           0.37                            +1125A
+1125A  0.      1.              .228
PBEAM   1126    2       0.290   1.      .15                             +1126
+1126   NO      1.      0.230                                           +1126A
+1126A  0.      1.              .231
PBEAM   1127    2       0.230   1.      .15                             +1127
+1127   NO      1.      0.180                                           +1127A
+1127A  0.      1.              .244
PBEAM   1128    2       0.180   1.      .15                             +1128
+1128   NO      1.      0.150                                           +1128A
+1128A  0.      1.              .182
PBEAM   1131    2       24.900  1.      2.334                           +1131
+1131   NO      1.0     41.600          4.497                           +1131A
+1131A  0.      1.              -.502
PBEAM   1132    2       22.300  1.      1.258                           +1132
+1132   NO      1.0     43.800          6.091                           +1132A
+1132A  0.      1.              -.651
PBEAM   1133    2       43.800  1.      6.091           .001            +1133
+1133   NO      1.0     46.400          8.843                           +1133A
+1133A  0.      1.              -.058
PBEAM   1134    2       46.4    100.    13.5            10.             +1134
+1134   NO      1.      50.68                                           +1134A
+1134A  0.      1.              -8.82-2
PBEAM   1135    2       20.300  1.      1.601                           +1135
+1135   NO      1.0     39.600          5.214                           +1135A
+1135A  0.      1.              -.644
PBEAM   1136    2       17.900  1.      1.469                           +1136
+1136   NO      1.0     35.300          4.849                           +1136A
+1136A  0.      1.              -.654
PBEAM   1137    2       35.300  1.      4.849           .001            +1137
+1137   NO      1.0     39.910          7.360                           +1137A
+1137A  0.      1.              -.123
PBEAM   1138    2       39.91   100.    10.5            10.             +1138
+1138   NO      1.      40.37                                           +1138A
+1138A  0.      1.              -1.15-2
PBEAM   1139    2       15.900  1.      1.286                           +1139
+1139   NO      1.0     31.800          4.283                           +1139A
+1139A  0.      1.              -.667
PBEAM   1140    2       14.000  1.      .836                            +1140
+1140   NO      1.0     28.200          2.827                           +1140A
+1140A  0.      1.              -.673
PBEAM   1141    2       28.200  1.      2.827           .001            +1141
+1141   NO      1.0     32.160          4.634                           +1141A
+1141A  0.      1.              -.131
PBEAM   1142    2       32.16   100.    7.94            10.             +1142
+1142   NO      1.      32.70                                           +1142A
+1142A  0.      1.              -1.67-2
PBEAM   1143    2       12.800  1.      .537                            +1143
+1143   NO      1.0     26.050          1.860                           +1143A
+1143A  0.      1.              -.682
PBEAM   1144    2       11.190  1.      .541                            +1144
+1144   NO      1.0     23.000          1.894                           +1144A
+1144A  0.      1.              -.691
PBEAM   1145    2       23.000  1.      1.894           .001            +1145
+1145   NO      1.0     25.560          3.414                           +1145A
+1145A  0.      1.              -.105
PBEAM   1146    2       25.56   100.    6.5             10.             +1146
+1146   NO      1.      27.16                                           +1146A
+1146A  0.      1.              -6.070-2
PBEAM   1147    2       9.060   1.      .492                            +1147
+1147   NO      1.0     19.800          1.700                           +1147A
+1147A  0.      1.              -.744
PBEAM   1148    2       7.640   1.      .210                            +1148
+1148   NO      1.0     17.500          .929                            +1148A
+1148A  0.      1.              -.784
PBEAM   1149    2       17.500  1.      .929            .001            +1149
+1149   NO      1.0     18.620          1.942                           +1149A
+1149A  0.      1.              -.062
PBEAM   1150    2       18.62   100.    4.32            10.             +1150
+1150   NO      1.      19.3                                            +1150A
+1150A  0.      1.              -3.59-2
PBEAM   1151    2       7.100   1.      .042                            +1151
+1151   NO      1.0     16.900          .269                            +1151A
+1151A  0.      1.              -.817
PBEAM   1152    2       22.300  1.      1.150                           +1152
+1152   NO      1.0     24.900          1.440                           +1152A
+1152A  0.      1.              -.110
PBEAM   1153    2       20.300  1.      .870                            +1153
+1153   NO      1.0     22.300          1.150                           +1153A
+1153A  0.      1.              -.094
PBEAM   1154    2       17.900  1.      .630                            +1154
+1154   NO      1.0     20.300          .870                            +1154A
+1154A  0.      1.              -.126
PBEAM   1155    2       15.900  1.      .470                            +1155
+1155   NO      1.0     17.900          .630                            +1155A
+1155A  0.      1.              -.118
PBEAM   1156    2       14.000  1.      .340                            +1156
+1156   NO      1.0     15.900          .470                            +1156A
+1156A  0.      1.              -.127
PBEAM   1157    2       12.800  1.      .260                            +1157
+1157   NO      1.0     14.000          .340                            +1157A
+1157A  0.      1.              -.090
PBEAM   1158    2       11.190  1.      .280                            +1158
+1158   NO      1.0     12.800          .260                            +1158A
+1158A  0.      1.              -.134
PBEAM   1159    2       9.060   1.      .260                            +1159
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+1159   NO      1.0     11.190          .280                            +1159A
+1159A  0.      1.              -.210
PBEAM   1160    2       7.640   1.      .170                            +1160
+1160   NO      1.0     9.060           .260                            +1160A
+1160A  0.      1.              -.170
PBEAM   1161    2       7.100   1.      .120                            +1161
+1161   NO      1.0     7.640           .170                            +1161A
+1161A  0.      1.              -.073
PBEAM   1162    2       43.800  1.      5.189                           +1162
+1162   NO      1.0     41.600          5.636                           +1162A
+1162A  0.      1.              .052
PBEAM   1163    2       39.600  1.      4.049                           +1163
+1163   NO      1.0     43.800          5.170                           +1163A
+1163A  0.      1.              -.101
PBEAM   1164    2       35.300  1.      3.053                           +1164
+1164   NO      1.0     39.600          4.049                           +1164A
+1164A  0.      1.              -.115
PBEAM   1165    2       31.800  1.      2.364                           +1165
+1165   NO      1.0     35.300          3.040                           +1165A
+1165A  0.      1.              -.104
PBEAM   1166    2       28.200  1.      1.762                           +1166
+1166   NO      1.0     31.800          2.354                           +1166A
+1166A  0.      1.              -.120
PBEAM   1167    2       26.050  1.      1.444                           +1167
+1167   NO      1.0     28.200          1.754                           +1167A
+1167A  0.      1.              -.079
PBEAM   1168    2       23.000  1.      1.274                           +1168
+1168   NO      1.0     26.050          1.431                           +1168A
+1168A  0.      1.              -.124
PBEAM   1169    2       19.800  1.      1.019                           +1169
+1169   NO      1.0     23.000          1.269                           +1169A
+1169A  0.      1.              -.150
PBEAM   1170    2       17.500  1.      .706                            +1170
+1170   NO      1.0     19.800          1.007                           +1170A
+1170A  0.      1.              -.123
PBEAM   1171    2       16.900  1.      .588                            +1171
+1171   NO      1.0     17.500          .709                            +1171A
+1171A  0.      1.              -.035
PBEAM   1181    2       0.341   100.    4.328           .001            +1181
+1181   NO      1.      1.0025          10.953                          +1181A
+1181A  0.      1.              -.984
PBEAM   1182    2       1.604   1.      75.00000        .265            +1182
+1182   NO      1.0     1.365           70.00000                        +1182A
+1182A  0.      1.              .1611
PBEAM   1183    2       68.240  1.      70.00000        .265            +1183
+1183   NO      1.0     53.180          18.30000                        +1183A
+1183A  0.      1.              .2481
PBEAM   1184    2       1.064   1.      18.30000        .265            +1184
+1184   NO      1.0     .715            5.30000                         +1184A
+1184A  0.      1.              .3923
PBEAM   1185    2       .715    1.      5.30000         .265            +1185
+1185   NO      1.0     .370            .65000                          +1185A
+1185A  0.      1.              .6362
PBEAM   1186    2       22.130  1.      7.00000         .265            +1186
+1186   NO      1.0     21.000          7.00000                         +1186A
+1186A  0.      1.              .0524
PBEAM   1187    2       21.000  1.      7.00000         .265            +1187
+1187   NO      1.0     16.200          .95000                          +1187A
+1187A  0.      1.              .2581
PBEAM   1188    2       16.200  1.      .95000          .265            +1188
+1188   NO      1.0     10.900          .30000                          +1188A
+1188A  0.      1.              .3911
PBEAM   1189    2       10.900  1.      .30000          .265            +1189
+1189   NO      1.0     5.690           .04000                          +1189A
+1189A  0.      1.              .6281
PBEAM   1190    2       3.414   100.    1.1             .001            +1190
+1190   NO      1.      2.802           1.0                             +1190A
+1190A  0.      1.              .197
PBEAM   1191    2       18.680  1.      5.80000         .265            +1191
+1191   NO      1.0     18.680          5.80000                         +1191A
+1191A  0.      1.              .0000
PBEAM   1192    2       18.680  1.      5.80000         .265            +1192
+1192   NO      1.0     14.740          .28300                          +1192A
+1192A  0.      1.              .2358
PBEAM   1193    2       14.740  1.      .28300          .265            +1193
+1193   NO      1.0     9.990           .09600                          +1193A
+1193A  0.      1.              .3841
PBEAM   1194    2       9.990   1.      .09600          .265            +1194
+1194   NO      1.0     5.250           .01400                          +1194A
+1194A  0.      1.              .6220
PBEAM   1195    2       35.960  1.      5.14100         .265            +1195
+1195   NO      1.0     33.740          5.13000                         +1195A
+1195A  0.      1.              .0637
PBEAM   1196    2       33.740  1.      5.13000         .265            +1196
+1196   NO      1.0     26.740          .22400                          +1196A
+1196A  0.      1.              .2315
PBEAM   1197    2       26.740  1.      .22400          .265            +1197
+1197   NO      1.0     18.100          .07510                          +1197A
+1197A  0.      1.              .3854
PBEAM   1198    2       18.100  1.      .07510          .265            +1198
+1198   NO      1.0     9.500           .01143                          +1198A
+1198A  0.      1.              .6232
PBEAM   1199    2       0.924   100.    0.32            .001            +1199
+1199   NO      1.      0.7535          0.25                            +1199A
+1199A  0.      1.              .203
PBEAM   1200    2       15.070  1.      3.20000         .265            +1200
+1200   NO      1.0     15.070          3.20000                         +1200A
+1200A  0.      1.              .0000
PBEAM   1201    2       15.070  1.      3.20000         .265            +1201
+1201   NO      1.0     13.370          .17300                          +1201A
+1201A  0.      1.              .1195
PBEAM   1202    2       13.370  1.      .17300          .265            +1202
+1202   NO      1.0     8.120           .05600                          +1202A
+1202A  0.      1.              .4886
PBEAM   1203    2       8.120   1.      .05600          .265            +1203
+1203   NO      1.0     4.260           .00880                          +1203A
+1203A  0.      1.              .6236
PBEAM   1204    2       15.940  1.      2.00000         .265            +1204
+1204   NO      1.0     13.940          2.00000                         +1204A
+1204A  0.      1.              .1339
PBEAM   1205    2       13.940  1.      2.00000         .265            +1205
+1205   NO      1.0     11.130          .10800                          +1205A
+1205A  0.      1.              .2242
PBEAM   1206    2       11.130  1.      .10800          .265            +1206
+1206   NO      1.0     7.530           .03700                          +1206A
+1206A  0.      1.              .3859
PBEAM   1207    2       7.530   1.      .03700          .265            +1207
+1207   NO      1.0     3.950           .00580                          +1207A
+1207A  0.      1.              .6237
PBEAM   1208    2       12.820  1.      1.20000         .265            +1208
+1208   NO      1.0     12.820          1.20000                         +1208A
+1208A  0.      1.              .0000
PBEAM   1209    2       12.820  1.      1.20000         .265            +1209
+1209   NO      1.0     10.280          .07100                          +1209A
+1209A  0.      1.              .2199
PBEAM   1210    2       10.280  1.      .07100          .265            +1210
+1210   NO      1.0     6.960           .02500                          +1210A
+1210A  0.      1.              .3852
PBEAM   1211    2       6.960   1.      .02500          .265            +1211
+1211   NO      1.0     3.640           .00370                          +1211A
+1211A  0.      1.              .6264
PBEAM   1212    2       0.7055  100.    0.32            .001            +1212
+1212   NO      1.      0.63            0.25                            +1212A
+1212A  0.      1.              .113
PBEAM   1213    2       12.600  1.      .70000          .265            +1213
+1213   NO      1.0     11.690          .70000                          +1213A
+1213A  0.      1.              .0749
PBEAM   1214    2       11.690  1.      .70000          .265            +1214
+1214   NO      1.0     9.420           .05530                          +1214A
+1214A  0.      1.              .2151
PBEAM   1215    2       9.420   1.      .05530          .265            +1215
+1215   NO      1.0     6.360           .01900                          +1215A
+1215A  0.      1.              .3878
PBEAM   1216    2       6.360   1.      .01900          .265            +1216
+1216   NO      1.0     3.330           .00290                          +1216A
+1216A  0.      1.              .6254
PBEAM   1217    2       11.400  1.      .40000          .265            +1217
+1217   NO      1.0     10.620          .40000                          +1217A
+1217A  0.      1.              .0708
PBEAM   1218    2       10.620  1.      .40000          .265            +1218
+1218   NO      1.0     8.570           .01970                          +1218A
+1218A  0.      1.              .2137
PBEAM   1219    2       8.570   1.      .01970          .265            +1219
+1219   NO      1.0     5.750           .00760                          +1219A
+1219A  0.      1.              .3939
PBEAM   1220    2       5.750   1.      .00760          .265            +1220
+1220   NO      1.0     2.990           .00130                          +1220A
+1220A  0.      1.              .6316
PBEAM   1231    2       .189    1.      2.20872         3.000           +1231
+1231   NO      1.0     .614            25.02095                        +1231A
+1231A  0.      1.              -1.0587
PBEAM   1232    2       .280    1.      1.74280         2.000           +1232
+1232   NO      1.0     .315            2.20872                         +1232A
+1232A  0.      1.              -.1169
PBEAM   1233    2       .152    1.      1.15839         .900            +1233
+1233   NO      1.0     .168            1.42177                         +1233A
+1233A  0.      1.              -.1018
PBEAM   1234    2       .226    1.      .74641          .700            +1234
+1234   NO      1.0     .253            .93783                          +1234A
+1234A  0.      1.              -.1127
PBEAM   1235    2       .125    1.      .55802          .400            +1235
+1235   NO      1.0     .136            .65330                          +1235A
+1235A  0.      1.              -.0779
PBEAM   1236    2       .115    1.      .40738          .300            +1236
+1236   NO      1.0     .125            .48321                          +1236A
+1236A  0.      1.              -.0837
PBEAM   1237    2       .175    1.      .28956          .150            +1237
+1237   NO      1.0     .192            .34903                          +1237A
+1237A  0.      1.              -.0922
PBEAM   1238    2       .096    1.      .20137          .075            +1238
+1238   NO      1.0     .105            .24515                          +1238A
+1238A  0.      1.              -.0959
PBEAM   1241    2       16.200  1.      .01850          3.000           +1241
+1241   NO      1.0     53.180          .26000                          +1241A
+1241A  0.      1.              -1.0660
PBEAM   1242    2       14.740  1.      .01400          2.000           +1242
+1242   NO      1.0     16.200          .01850                          +1242A
+1242A  0.      1.              -.0944
PBEAM   1243    2       13.370  1.      .00940          .900            +1243
+1243   NO      1.0     14.740          .01400                          +1243A
+1243A  0.      1.              -.0975
PBEAM   1244    2       13.370  1.      .00690          .700            +1244
+1244   NO      1.0     13.370          .00940                          +1244A
+1244A  0.      1.              .0000
PBEAM   1245    2       11.130  1.      .00450          .400            +1245
+1245   NO      1.0     13.370          .00690                          +1245A
+1245A  0.      1.              -.1829
PBEAM   1246    2       10.280  1.      .00330          .300            +1246
+1246   NO      1.0     11.130          .00450                          +1246A
+1246A  0.      1.              -.0794
PBEAM   1247    2       9.420   1.      .00210          .150            +1247
+1247   NO      1.0     10.280          .00330                          +1247A
+1247A  0.      1.              -.0873
PBEAM   1248    2       8.570   1.      .00150          .075            +1248
+1248   NO      1.0     9.420           .00210                          +1248A
+1248A  0.      1.              -.0945
PBEAM   1251    2       10.900  1.      .00604          3.000           +1251
+1251   NO      1.0     35.740          .08200                          +1251A
+1251A  0.      1.              -1.0652
PBEAM   1252    2       9.990   1.      .00460          2.000           +1252
+1252   NO      1.0     10.900          .00604                          +1252A
+1252A  0.      1.              -.0871
PBEAM   1253    2       9.050   1.      .00315          .900            +1253
+1253   NO      1.0     9.990           .00460                          +1253A
+1253A  0.      1.              -.0987
PBEAM   1254    2       8.120   1.      .00232          .700            +1254
+1254   NO      1.0     9.050           .00315                          +1254A
+1254A  0.      1.              -.1083
PBEAM   1255    2       7.530   1.      .00149          .400            +1255
+1255   NO      1.0     8.120           .00232                          +1255A
+1255A  0.      1.              -.0754
PBEAM   1256    2       6.960   1.      .00112          .300            +1256
+1256   NO      1.0     7.530           .00149                          +1256A
+1256A  0.      1.              -.0787
PBEAM   1257    2       6.360   1.      .00074          .150            +1257
+1257   NO      1.0     6.960           .00112                          +1257A
+1257A  0.      1.              -.0901
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RBAR	3166	3077	3091	123456	123
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RBAR	3168	3082	3093	123456	123

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RBAR    3170    3077    3095    123456                  123
RBAR    3171    3078    3096    123456                  123
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SPC1    3       1       368     369     370     371     373     381
SPC1    3       1       383     384     385     386     387     389
SPC1    3       1       390     391     392     393     408
SPC1    3       156     36      42      50      437     59      431
SPC1    3       156     71      84      298     286     117     285
SPC1    3       156     163     164     153     154     155     156
SPC1    3       156     267     268     458     459
SPC1    3       156     283     284     282     281     405
SPC1    4       234     36      42      50      437     59      431
SPC1    4       234     71      84      298     286     117     285
SPC1    4       234     163     164     153     154     155     156
SPC1    4       234     267     268     458     459
SPC1    4       234     283     284     282     281     405
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SPC1    5       4       3077
SPC1    5       456     251     256     261     262     266
SPC1    5       456     1001    1002    1003    1004    1005    1006
SPC1    5       456     1007    1008    1010    1012    1014    1016
SPC1    5       456     1018    1173    1174    1175    1176    1177
SPC1    5       456     1019    THRU    1027
SPC1    5       456     1029    1030    1032    1033    1038    1039
SPC1    5       456     1031    1034    1037    1040    1045    1048
SPC1    5       456     1044    1046    1047    1051    1052    1053
SPC1    5       456     1054    1057    1066    1069    1079    1082
SPC1    5       456     1055    1056    1060    1061    1062    1063
SPC1    5       456     1064    1065    1067    1068    1072    1073
SPC1    5       456     1074    1075    1076    1077    1078    1080
SPC1    5       456     1079    1114    1275    1276    1280    1290
SPC1    5       456     1081    1085    1086    1087    1088
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SPC1    5       456     1096    1097    1098    1099    1100    1101
SPC1    5       456     1102    1103    1104    1105    1106    1107
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SPC1    5       456     1143
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SPC1    5       456     1233    2233
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SPC1    5       456     1501    THRU    1526
SPC1    5       456     2001    2002    2003    2004    2005    2006
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SPC1    5       456     2018    2173    2174    2175    2176    2177
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SPC1    5       456     2081    2085    2086    2087    2088
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SPC1    5       456     2096    2097    2098    2099    2100    2101
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SPC1    5       456     2108    2109    2110    2111    2112    2113
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SPC1    5       456     2140    2141    2142
SPC1    5       456     2143
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SPC1    5       456     2501    THRU    2526
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SPCADD  2       4       5
SUPORT  42      156
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